INSTRUCTION MANUAL

for

THE NATIONAL NC-183 D

RADIO RECEIVER

A Receiver designed to combine performance and versatility "plus" for the critical user.

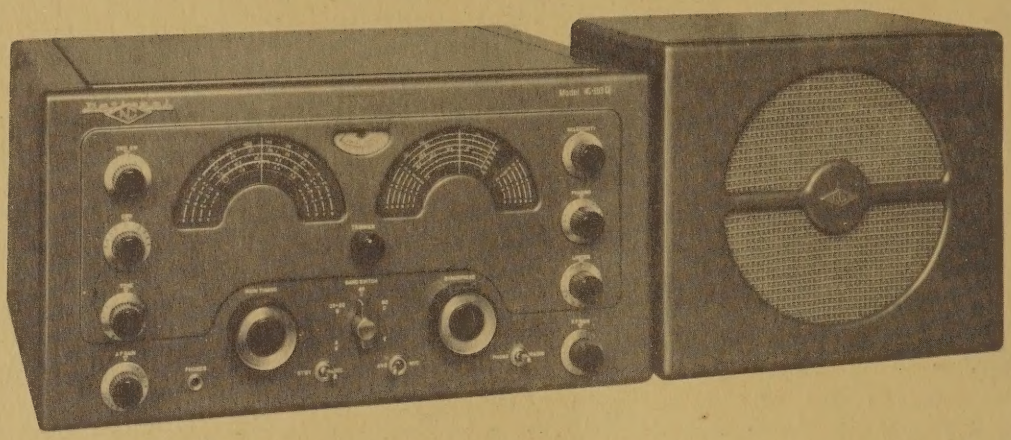
National

NC

EST. 1914

PRICE $1.00

National



NC-183D RECEIVER

FEATURES . . .

- 0.54 to 31. mc. plus 47-55 mc. Frequency Coverage.
- Calibrated Amateur Band Spread for 6, 10-11, 15, 20, 40 and 80 Meter Bands.
- Two R. F. Amplifier Stages for Excellent Sensitivity.
- Three I. F. Amplifier Stages for Improved Selectivity.
- Double Conversion on the A, B and C Bands for a High Order of Image Rejection (62 db. on 10 meters).
- Double-Diode Noise Limiter Effective on Both Phone and C. W. Reception.
- A Wide Range Crystal Filter with 6 Uniform Steps of Selectivity Variation.
- A. V. C. for Both Phone and C. W. Reception.
- S-Meter with Adjustable Sensitivity for Phone and C. W. Reception.
- Stabilized Voltage Regulated Circuits and Push-Pull Audio Output Stage.
- Accessory Connector Socket and Phonograph Input Jack.
- Loudspeaker in Matching Cabinet.

National Co., Inc.

THE NATIONAL NC-183D RECEIVER

Equipment List

NC-183DT RECEIVER, table mounting gray finish, complete with tubes, crystal filter, noise limiter, 115 and 230 volt, 50/60 cycle built-in power supply.

NC-183DTS 10″ PM Loudspeaker in matching cabinet for the above Receiver.

NC-183DR RECEIVER, same as table model but mounted on ⅛″ aluminum standard rack panel, 10½″ high, gray finish.

NC-183DRS 10″ PM Loudspeaker mounted on ⅛″ aluminum standard rack panel, 10½″ high, gray finish.

NFM-83-50 Narrow-Band F.M. Adaptor.

SOJ-3 Select-O-Ject.

Prices on Application

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U. S. A.

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THE NC-183D RADIO RECEIVER

SIMPLIFIED OPERATING INSTRUCTIONS

1. OPERATING INSTRUCTIONS

Operating instructions for the NC-183D Receiver are presented here in a non-technical manner to enable those persons not familiar with a communications-type receiver to operate the NC-183D efficiently with a minimum of effort. To obtain the maximum in listening pleasure it is recommended that these two pages are thoroughly read before operation of the NC-183D is attempted, although no damage to the receiver can result through improper adjustment of controls. Installation instructions have been intentionally omitted here because it is recommended that an experienced technician install the NC-183D. However, in the event that an inexperienced person must, of necessity, install the receiver, adhering to the instructions given in Section 2–3 of this Instruction Manual will enable him to do so.

The illustration on this page, identifying and locating receiver controls, shows the operating procedure to follow in the proper sequence. This same procedure follows with a brief explanation of what each control does. The reader should refer to Section 3 of the Instruction Manual if more detailed and technical information is desired. To tune the Broadcast and Short Wave bands the operating instructions are as follows:

1. Set the St'by-Rec. switch at Rec. The St'by position of this switch silences the receiver for a period of time after which resumption of reception may be had by setting the switch at Rec.

2. Set the A.V.C.-M.V.C. switch at A.V.C. Automatic volume control is provided when this switch is in the A.V.C. position to compensate for fluctuating volume due to fading.

3. Set the Radio-Phono switch at Radio. The Phono position of this switch is used when a record player or similar device is connected to the Phono Input jack at the rear of the receiver.

4. Turn the R.F. Gain control to 10. When this control is turned from 0 to 10 the sensitivity (ability to receive weak and distant stations) is progressively increased to a maximum at 10.

5. Set the Tone control at 5. A variable selection of tonal output from a bass tone at 0 to a tone at 10 in which the highs are predominant is provided by this control. The setting recommended here will give a normal tone output but may be changed for different types of programs.

6. Set the C.W.O. switch at Off. This switch is used only for the reception of code signals.

7. Turn the C.W.O. control to 0. This control is used only for the reception of code signals and does not effect receiver performance with the C.W.O. switch at Off.

8. Set the Selectivity switch at Off. This switch is generally used only when interference by other stations is encountered. Its operation is somewhat complex and is not recommended for the inexperienced operator. See Section 3 for detailed instructions.

9. Turn the Phasing control to 0. The Phasing control is used in conjunction with the Selectivity switch.

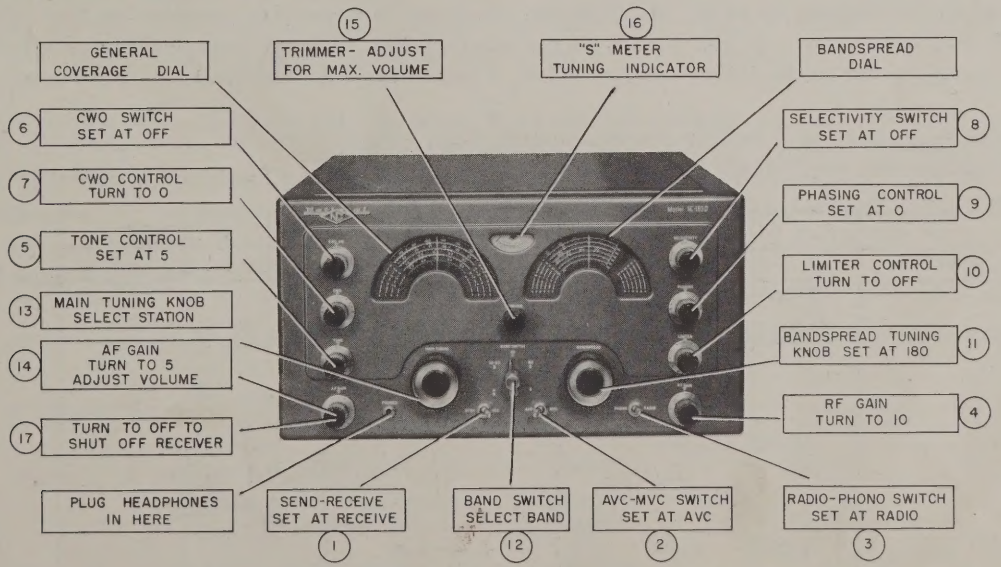


Figure No. 1. Simplified Operating Instructions

10. Turn the Limiter control to Off. Reduction of interference caused by static, automobile ignition, etc., can be effected by turning on the Limiter. Its action is increasingly effective as the control is turned towards 10.

11. Turn the Bandspread tuning dial knob to the SET mark at 180 on the linear scale of the Bandspread dial. The Bandspread dial knob and scale should be kept at the above setting when the Main Tuning dial knob and scale are used. However, the Bandspread dial may be rotated to either side of the SET mark if fine tuning is preferred for Short Wave or Amateur bands.

NOTE

The operator is now ready to adjust the tuning controls to select the desired station. Let us, for example, suppose that the desired station is one on the Broadcast band at 1,000 kilocycles.

12. Set the Band Switch at E. The Band Switch selects the band of frequencies to be tuned and is marked with designating letters which correspond to the markings at the edges and throughout the dial scales.

13. Turn the Main Tuning dial knob to set the pointer on the General Coverage dial at 1.0 on the E band. Stations on the General Coverage dial scales are selected by means of this control.

14. Turn the A.F. Gain control to 5. This is a dual-purpose control; when turned from A.C. Off to 0, the receiver is turned On; when turned from 0 to 10 the audio volume is adjusted from a minimum at 0 to a maximum at 10. This control should be adjusted to suit the listener.

15. Adjust the Trimmer control for maximum volume. After a station has been tuned in, adjust this control for best reception.

16. S-Meter. Maximum deflection of the meter pointer indicates the dial and trimmer control settings for optimum tuning.

17. Shutting off the receiver. To shut off the receiver, turn the A.F. Gain control to A.C.-Off. This is the only adjustment which completely shuts off the receiver and the only one which need be made.

The General Coverage dial has five scales; four of which are calibrated directly in megacycles and the other has a linear scale numbered 0 to 200. All markings of the Standard Broadcast Band E are colored for clear identification. The other three scales have colored letters throughout their range for band identification plus heavy white underlines locating short-wave features marked F, A and P indicating Foreign, Amateur and Police bands, respectively.

The Bandspread dial has seven scales, six of which are calibrated directly in megacycles and the other has a linear scale numbered 0 to 200. Each scale is marked with the band covering that frequency i.e.,6, 10, 15, 20, 40 and 80 meter band. The frequency in megacycles is marked in white while the band in meters and the SET mark is colored.

The Band Switch positions are also marked with band letter designations to correspond to the markings at the edges and throughout the dial scales. Newspapers and other publications sometimes give the frequency of stations in kilocycles and as the dial scales of the NC-183D are calibrated in megacycles conversion from kilocycles to megacycles will facilitate location of the station on the receiver dial. This is done by pointing off three places to the left of the decimal point on the kilocycle figure, i.e., 1,000. kilocycles becomes 1.0 megacycles.

The following table lists each band by its designating letter and the frequency coverage of that band. The frequencies are listed in both megacycles and kilocycles. Also listed are the frequencies of short-wave features to be found on the various bands.

BAND	FREQUENCY COVERAGE		POLICE	INT. B'DCAST	AMATEUR
	Megacycles	Kilocycles	Megacycles	Megacycles	Megacycles
A	47.0 - 55.0	47,000 - 55,000			50.0 - 54.0
B	12.0 - 31.0	12,000- 31,000		15.1 - 15.3 17.7 - 17.9 21.5 - 21.7	14.0 - 14.4 21.0 - 21.5 26.96 - 29.7
C	4.4 - 12.0	4,400 -12,000		6.0 - 6.2 9.5 - 9.7 11.7 - 11.9	7.0 - 7.3
D	1.55- 4.4	1,600 - 4,400	1.6 - 1.8 2.25- 2.5 2.7 - 2.85		3.5 - 4.0
E	0.54- 1.55	540 - 1,600			

THE NC-183D RADIO RECEIVER

SECTION 1. DESCRIPTION

1–1. GENERAL

The new NC-183D is a deluxe radio receiver featuring performance and versatility 'plus'. Two R.F. stages, three I.F. Amplifier stages and two frequency conversion stages give this new series that extra measure of sensitivity and image rejection so often needed to insure uninterrupted reception at the high frequencies. A double-diode noise limiter reduces interference caused by external noise pulses and a voltage regulated converter and C.W. oscillator circuits assure a minimum of frequency drift for both phone and code reception. The selectivity characteristic of the NC-183D is adjustable over a wide range from broadcast requirements to sharp amateur single signal reception. The push-pull audio system delivers the utmost in audio frequency response and undistorted power output from the built-in output transformer.

Fifteen tubes, plus a voltage regulator and a rectifier, are utilized by the NC-183D in a superheterodyne circuit for the reception of phone and code signals throughout its frequency range of 540 kcs. to 31 mcs. and 47 to 55 mcs. Calibrated bandspread tuning is furnished for the main amateur bands i.e., 6, 10-11, 15, 20, 40 and 80 meters. Separate directly-calibrated dial scales and associated controls are used for general coverage and bandspread tuning, respectively. An S meter, with a semi-permanent sensitivity adjustment at the back of the receiver, is mounted on the front panel for signal strength readings of both phone and code signals.

An accessory socket is mounted on the receiver chassis to accommodate such accessories as a National Type SOJ-3 Select-O-Ject, a National Type NFM-83-50 FM adaptor, etc. At the rear of the receiver a socket is available for external use of a battery power supply. Other highlights include a six-position crystal filter, maximum bandspreading of the amateur bands, a quick-action band switch, a phonograph input jack and a terminal panel to permit series or parallel remote standby-receive switch connections.

The complete equipment consists of a receiver, with built-in power supply, and a loudspeaker. Available accessories include the National Types NFM-83-50 Narrow-Band F.M. Adaptor and SOJ-3 Select-O-Ject.

1–2. CIRCUIT

The double conversion circuit of the NC-183D achieves a very advantageous condition wherein the high I.F. provides a high order of image rejection and the low I.F. gives a sharper selectivity so necessary in a communication receiver. The incoming signal on Bands A, B and C is first converted to a high intermediate frequency of 1720 kcs. and then to the low intermediate frequency of 455 kcs. A new type sliding switch is ganged with the Band switch for an efficient and automatic insertion of the double conversion stage when either the A, B or C Band is in use. Selection of the D and E Bands results in a single conversion to an I.F. frequency of 455 kcs.

The circuit employed on all bands consists of two R.F. amplifier stages, the first converter, three I.F. amplifier stages, a diode type second detector and automatic volume control stage, an audio limiter, an S-meter amplifier stage, a high gain first audio stage, a phase inverter and a push-pull audio output stage. The crystal filter is connected into the first I.F. amplifier stage and the remainder of the circuit includes a C.W. oscillator, voltage regulator and rectifier stages.

1–3. TUBE COMPLEMENT

The NC-183D is supplied complete with tubes which are tested in the receiver at the time of alignment.

The tubes employed are as follows:

First R.F. Amplifier	6BA6
Second R.F. Amplifier	6BA6
First Converter	6BE6
Second Converter	6BE6
First I.F. Amplifier	6BA6
Second I.F. Amplifier	6BA6

Third I.F. Amplifier	6BA6
Second Detector - A.V.C.	6AL5
A.V.C. Amplifier	6AH6
C.W. Oscillator	6SJ7
Limiter	6AL5
First Audio	6SJ7
Phase Inverter - S-Meter Amp.	6SN7GT
Audio Output (2)	6V6GT
Voltage Regulator	OB2
Rectifier	5U4G

1–4. TUNING SYSTEM

The main tuning capacitor C-2 and the bandspread tuning capacitor C-3 are connected in parallel on all bands. Separate knobs with associated dial scales are used to operate these two capacitors to tune the frequency range of the Receiver in five bands as follows:

BAND	GENERAL COVERAGE	BANDSPREAD
A		47 - 55 Mc.
B	12 - 31 Mc.	26.5 - 30 Mc.
		20.0 - 21.5 Mc.
		14.0 - 14.4 Mc.
C	4.4 - 12 Mc.	6.9 - 7.3 Mc.
D	1.55 - 4.4 Mc.	3.5 - 4.0 Mc.
E	0.54 - 1.55 Mc.	

As will be noted from the above table, calibrated bandspread tuning is provided for the 6, 10-11, 15, 20, 40 and 80 meter amateur bands. This tuning system is extremely flexible in that bandspread tuning may be employed to tune any portion of any band in the 540 kcs. to 31 mc. range.

Band changing is accomplished by means of a highly efficient bandswitch which is ganged to the double conversion sliding switch.

Tuning of the first R.F. stage on all bands can be readily adjusted to compensate for a wide range of antenna loading conditions by means of the front panel mounted Trimmer control.

1–5. NOISE LIMITER

The noise limiter in the NC-183D receiver uses an automatic type double-action circuit resulting in the limiting of noise pulses on both positive and negative peaks. This noise limiting action is equally effective on both phone and C.W. reception. The usefulness of this limiter will be most appreciated on the higher frequency bands of the receiver where automobile ignition noise and other high frequency disturbances are effectively suppressed. A threshold control on the front panel permits adjustment of the level at which limiting action starts.

1–6. CRYSTAL FILTER

The selectivity characteristics of the NC-183D are made adjustable by means of a crystal filter, CF-1. This crystal filter is newly designed and incorporates features which make it highly flexible in its adjustment and superior in the efficiency of its operation. A six-position Selectivity switch and a crystal Phasing control are mounted on the front panel for the adjustment of this filter. Figure number 2 shows the characteristics of the receiver for each of the six degrees of selectivity.

The crystal filter provides uniform selectivity variation from the broad 'off' position to the sharp 'number 5' position and may be used for either phone or C.W. reception; any degree of selectivity from true single-signal to wide band AM broadcast reception being available. Operation of the phasing control provides for efficient

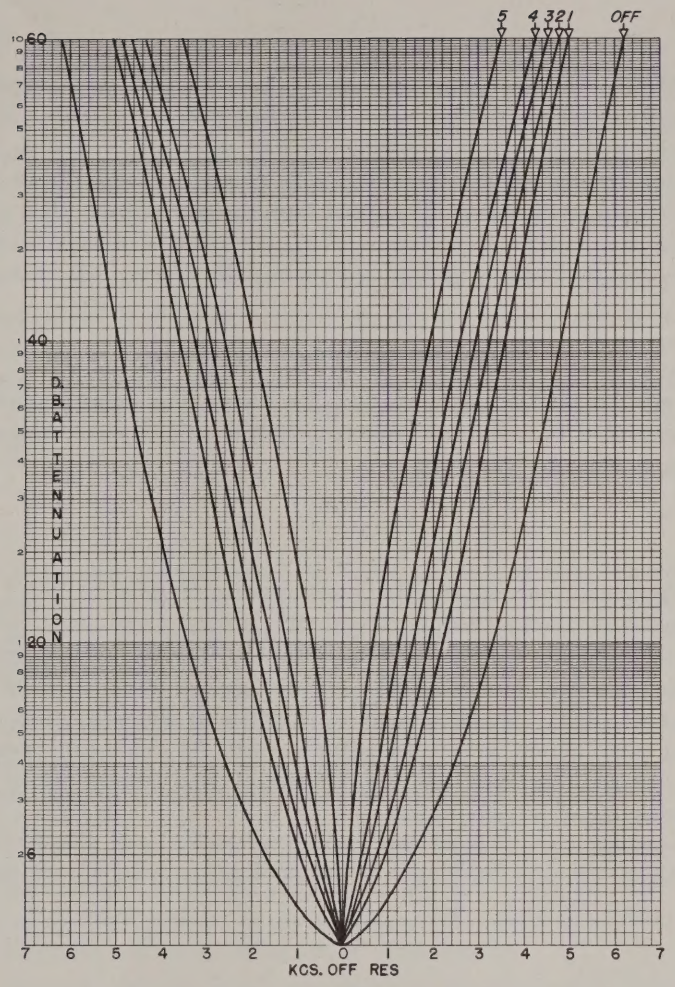


Figure No. 2. Crystal Filter Selectivity Curves

attenuation of interfering C.W. signals or M.C.W. signals which may produce objectionable heterodynes.

1–7. SIGNAL STRENGTH METER

An S-Meter for signal strength readings is associated with the A.V.C. circuit. The S-Meter scale is calibrated in S units from 1 to 9 with approximately 3.5 db per S unit, and in db above S9 from 0 to 40 db. An adjustment is provided to enable the operator to change the above calibration if he so desires. For the purpose of comparing strong signals, which cause the S-Meter to read off-scale, with other weaker signals the sensitivity of the S-Meter may be lowered by retarding the R.F. Gain control.

1–8. ACCESSORY CONNECTOR SOCKET

A standard octal socket, X-2, is mounted on the receiver chassis and wired in a manner to permit connection of various accessories such as a National Model SOJ-3 Select-O-Ject unit or a National type NFM-83-50 Narrow-Band-FM Adaptor.

The SOJ-3 is an audio frequency device designed to reject or boost any audio frequency selected at will between the limits of approximately 80 to 10,000 cycles. The unit will also serve as an audio oscillator and is excellent for code practice use.

The NFM-83-50 adapts the NC-183D to permit the reception of NBFM signals.

Refer to the back of this manual for detailed instructions on the use of the foregoing accessories.

1–9. TONE CONTROL

The tonal output of the NC-183D receiver may be varied to suit the listener by means of the Tone Control. In the extreme clockwise position the greatest degree of high audio frequency response is obtained and, as the control is rotated counterclockwise from 10 to 0, a comparatively flat response is obtained over the entire usable audio frequency range with the high audio frequencies being attenuated as illustrated in Figure Number 3. This control is particularly helpful when receiving weak signals through interference. If a signal is weak and partially obscured by background noise or static, an improvement in signal-to-noise ratio will be obtained by rotating the Tone Control in a counterclockwise direction thereby attenuating the higher audio frequencies.

1–10. ANTENNA INPUT

Antenna input terminals are provided at the rear of the Receiver. The input circuit is suitable for use with a single wire antenna, a balanced feed line or a low impedance (70 ohm) concentric transmission line. The average input circuit impedance is approximately 300 ohms.

1–11. AUDIO OUTPUT

The NC-183D features a push-pull output amplifier using inverse feed-back. See Figure No. 3 for the audio response. The matching transformer located inside the receiver provides two audio output circuits as follows:

(1) The transformer secondary leads are brought out to a three-terminal output board located at the rear of the receiver, having both 8 and 500-ohm terminals and a common ground terminal. The 8-ohm terminal provides output for the speaker voice coil and the 500-ohm terminal is available for connection to a 500-ohm line. Approximately 8 watts of undistorted audio output power is available while the maximum power is 11 watts. The audio output terminal board is located on the back of the receiver cabinet and is shielded by a metal cover which must be removed to gain access to the screw-type terminals.

(2) A headphone jack is mounted on the front panel and is wired so as to silence the loudspeaker on the insertion of a phone plug. The headphone load impedance is not critical allowing a wide range of headphone types to be used.

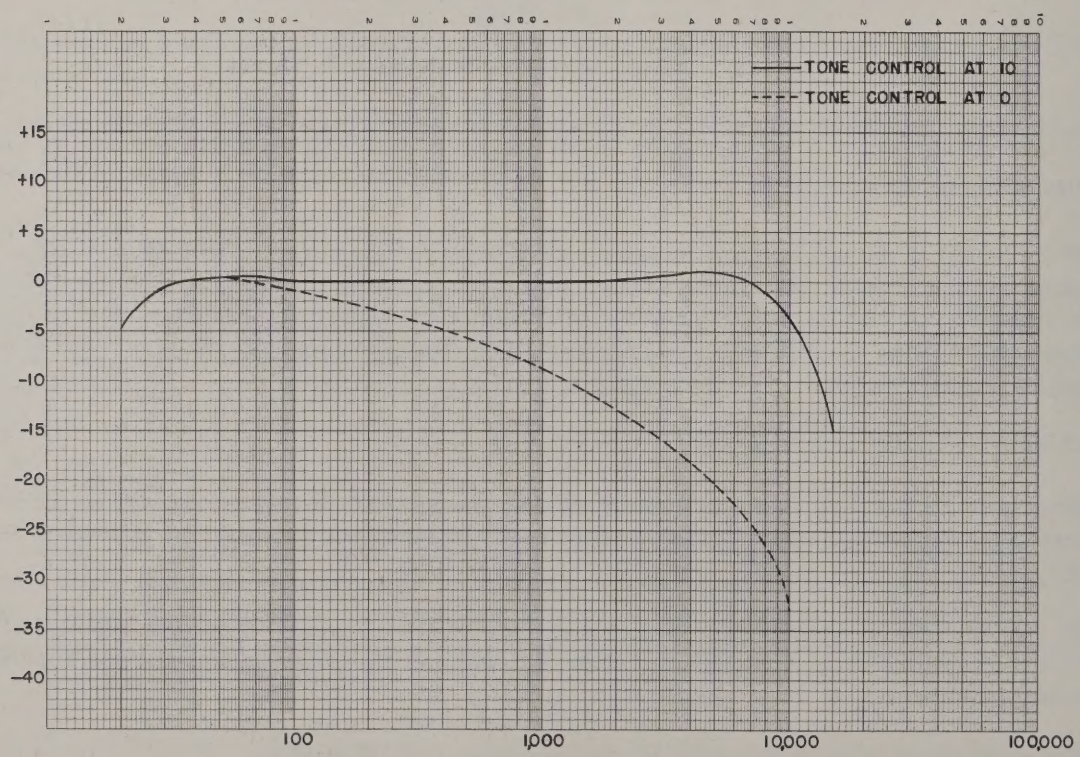


Figure No. 3. Audio Amplifier Frequency Response

1–12. PHONO INPUT JACK

A phono input jack is mounted at the rear of the receiver and can be used to connect auxiliary apparatus, such as a record player, to the audio system of the receiver. This input circuit is high impedance and feeds into the 6SJ7 first audio amplifier stage. The Radio-Phono switch on the front panel must be at the Phono position when the phono input jack is used. The Audio Gain and Tone controls are operative with this connection. The R.F. Gain control should be retarded to about zero to prevent an R.F. signal or input noise from interfering with record reproduction.

Most record players are terminated in a single shielded wire. The phono input jack on the NC-183D is the type that accomodates a phono tip plug and if the record player to be used is not fitted with such a plug one can be easily attached. If the output circuit of the record player is low impedance (less than 100,000 ohms) better results will be obtained if a suitable resistor, with a value as specified for the particular record player, is connected across the phono tip plug to properly load the record player output circuit.

1–13. POWER SUPPLY

The NC-183D Receiver is designed for operation from a 110/120 volt or 220/240 volt 50/60 cycle A.C. power source. The receiver is shipped from the factory with the power transformer wired for 110/120 volt operation only. A few simple wiring changes in the dual primary circuit of the power transformer are necessary to convert the NC-183D to 220/240 volt operation.

Normal power consumption is approximately 120 watts. The built-in power unit supplies all voltages required by the heater and B supply circuits -- 5.25 amperes at 6.3 volts and 140 milliamperes at 260 volts respectively In addition, this supply is also capable of furnishing all voltages required by accessories such as the NFM-83-50 and the SOJ-3.

A 2-ampere fuse is connected in one side of the A.C. input line to protect the receiver circuits against any voltage surges in the power line or short circuits in the receiver. This fuse is mounted in an extractor post at the rear of the receiver and is easily removed for examination or replacement.

1–14. LOUDSPEAKER

The loudspeaker supplied with the NC-183D is a 10-inch permanent magnet field type and is mounted in a cabinet finished to match the receiver. The loudspeaker impedance is 8 ohms and the attached spade lug terminal board strip connects to the 8-ohm binding posts on the audio output terminal board of the receiver. In the event a dynamic type loudspeaker is used, external means for supplying field excitation voltage will be necessary.

SECTION 2. INSTALLATION

2–1. ARRANGEMENT

The NC-183D receiver and loudspeaker may be arranged in any desired position although it is not recommended that the loudspeaker be placed on top of the receiver or near the antenna terminals as undesirable 'microphonics' may result. The receiver should not be installed in small, unventilated, or warm spaces. Wherever practicable, placement should be made to allow freedom of air circulation on all four sides.

2–2. ANTENNA RECOMMENDATIONS

The antenna input circuit of the receiver is arranged for operation from either a single-wire antenna, a doublet antenna or other types having impedances of 70 ohms or more. The antenna terminal strip, at the rear of the receiver, has three terminals, two are for antenna connections and the other for a ground. The ground terminal has connected to it a metal link which is used to ground one antenna lead as necessary. With balanced antenna systems, such as the doublet type, the metal link is not used. With an unbalanced system, such as the single-wire

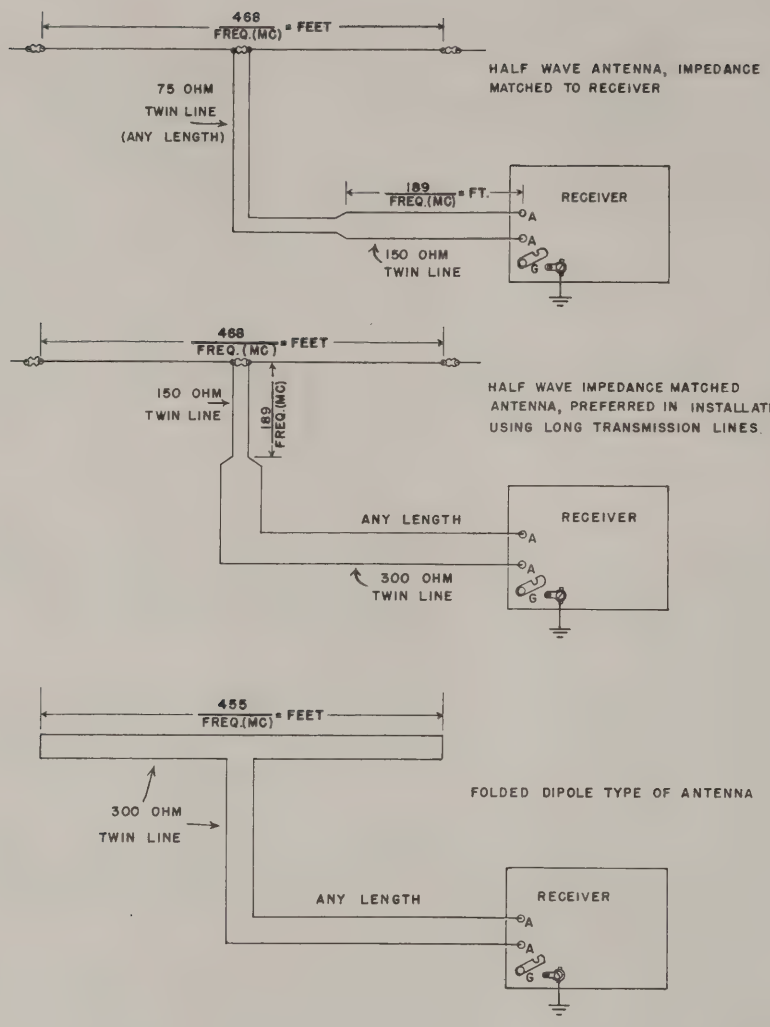

468 / FREQ.(MC) = FEET
HALF WAVE ANTENNA, IMPEDANCE MATCHED TO RECEIVER
75 OHM TWIN LINE (ANY LENGTH)
189 / FREQ.(MC) = FT.
RECEIVER
A
A
G
150 OHM TWIN LINE
468 / FREQ.(MC) = FEET
150 OHM TWIN LINE
189 / FREQ.(MC)
HALF WAVE IMPEDANCE MATCHED ANTENNA, PREFERRED IN INSTALLATIONS USING LONG TRANSMISSION LINES.
ANY LENGTH
RECEIVER
300 OHM TWIN LINE
455 / FREQ.(MC) = FEET
FOLDED DIPOLE TYPE OF ANTENNA
300 OHM TWIN LINE
ANY LENGTH
RECEIVER
NOTE: FIGURES FOR TWIN LINE APPLY ONLY TO TWIN LINE WITH POLYETHYLENE INSULATION.

Figure No. 4. Typical Antenna Installations

antenna, it is desirable to ground the unused antenna terminal by means of the metal link. For an unbalanced system of the concentric transmission line type, it is recommended that the outside of the concentric line be grounded directly to the ground lug below the antenna terminal strip. The external ground connection to the ground lug below the antenna terminal strip should be maintained at all times.

The most practicable antenna for use in installations where the receiver is to be used over a wide range of frequencies is the single wire type. An antenna length of from 50 to 100 feet is recommended. The antenna lead-in should be connected to one antenna terminal and the metal link used to ground the other terminal.

For best impedance matching to the antenna input circuit, an antenna with a 70 to 300 ohm transmission line is recommended. If a doublet type with a 70 to 300-ohm balanced transmission line is used the metal grounding link should not be used. For optimum results the antenna should be cut to the proper length corresponding to the desired operating frequency. See Figure No. 4. It must be remembered that an antenna installation of this type will have maximum efficiency over a narrow band of frequencies near the frequency for which the antenna was designed and will be most useful in installations where the receiver is tuned to one frequency or narrow band of frequencies. For other frequencies it would be desirable to connect the two transmission line leads together at one antenna terminal and the metal link used to ground the other terminal. The antenna is thus utilized as a single wire type.

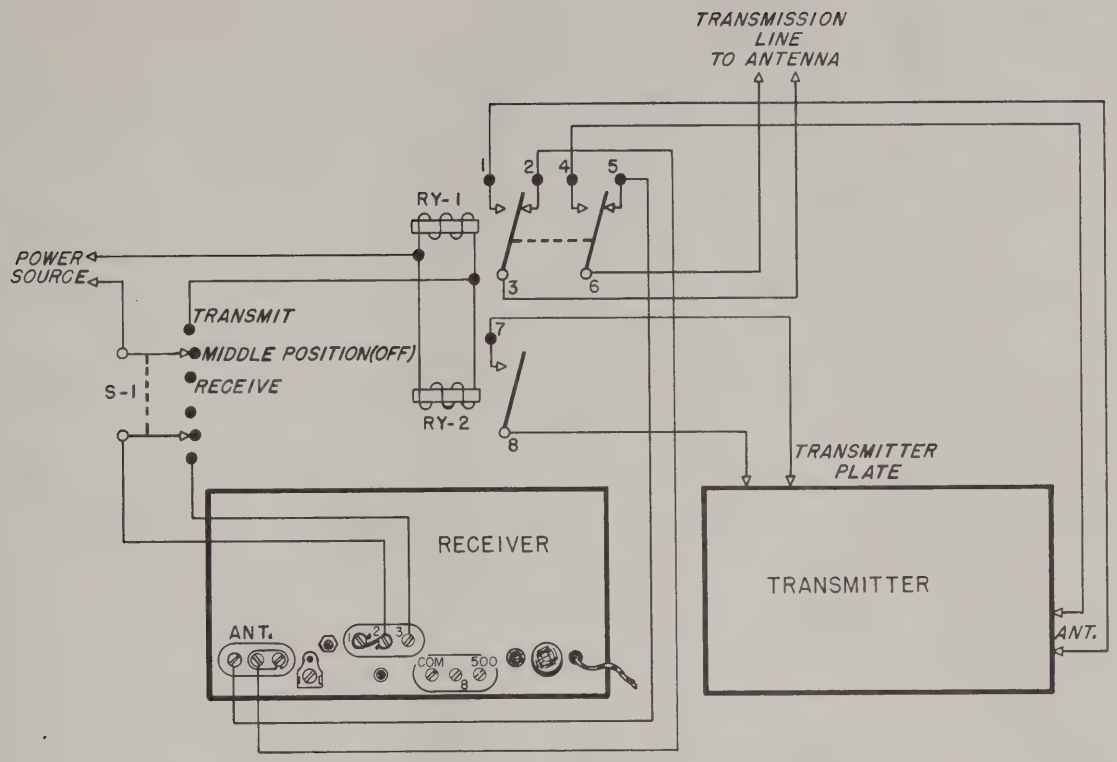


Figure No. 5. Typical Antenna Switching System

In an installation where the receiver is to be used as the receiving unit in a transmitting station, the most efficient operation will usually result from use of the transmitting antenna as a receiving antenna also. This is especially true if the transmitting antenna is of the multi-element, directional type as the same antenna gain is available for both receiving and transmitting -- a very desirable condition. For switching the antenna from transmitter to receiver, an antenna change-over relay is recommended.

A double-pole, double-throw relay possessing good high-frequency insulation is suitable. A second relay and a three position switch may be used to control the transmitter plate supply and the B+ circuits. This second relay should be a single-pole, single-throw type having one normally open pair of contacts. The schematic diagram of this type of control circuit is shown in Figure No. 5. With S-1 in the receive position the antenna transmission line is connected to the receiver by contacts 2, 3, 5 and 6 of relay RY-1; the B+ circuit of the receiver is completed by the switch. (The St'by-Rec. switch on the receiver should be set at St'by). With the switch in the transmit position RY-1 contacts 1, 3, 4 and 6 are closed transferring the antenna transmission line to the transmitter; contacts 7 and 8 of relay RY-2 close to complete the plate supply circuit to the transmitter. Contacts 7 and 8 of relay RY-2 should be in series with the primary of the transmitter plate supply transformer. Thus, the station is in the receiving condition with switch S-1 in the receive position and in the transmitting condition with S-1 in the transmit position. With S-1 in the mid-position the receiver B+ circuit and transmitter plate supply circuit are both open. In the mid-position the receiver B+ circuit is controlled by the St'by-Rec. switch on the front panel of the receiver.

NOTE

The first and second converter, C.W. oscillator, phase inverter, S-meter amplifier, voltage regulator and the push-pull audio output amplifier are not affected by the external relay connection to the receiver. Unless the A.F. Gain control is set at A.C.-Off, these circuits will obtain an uninterrupted B-plus supply

2–3. INSTALLATION

See Figure No. 6 for identification and location of items referred to below.

After unpacking the receiver and speaker procede as follows:

(1) Seat the A.C. jumper plug and all tubes firmly in their sockets.

NOTE: The remote St'by-Rec. switch and audio output terminals are each covered by a metal shield. The metal shield covers contain a plastic retaining type grommet with a short lead through it. Remove these covers, grommets and leads. Connect the speaker leads and/or external B+ leads through the respective shield cover to the appropriate terminals. Install the shields over the terminals and reassemble the grommets over the speaker leads and/or external B+ leads and attach the grommets securely to the shield covers.

(2) Connect the loudspeaker to the 8-ohm terminals of the audio output terminal strip at the rear of the receiver. Access to the terminal strip is gained by removal of the metal shield cover. This cover should be replaced after completion of the connections. A 500-ohm connection is provided if it is desired to connect to a 500-ohm line.

(3) Connect a good external ground to the screw-type lug located at the rear of the receiver below the antenna terminal strip.

(4) Connect the antenna as recommended in paragraph 2–2.

(5) The St'by-Rec. switch terminal panel at the rear of the receiver is provided for convenience in connecting an external B plus switch or relay. The panel is so arranged that either a series or a parallel connection may be made. Figure No. 5 illustrates a typical parallel connection. In the example shown the jumper is connected across terminals 1 and 2 and the external switch is connected to terminals 2 and 3. For a series arrangement, the jumper is removed and the switch is connected to terminals 1 and 2. The essential difference between the two types of connections is that with the parallel type the St'by-Rec. switch on the receiver is operative while in the series type the St'by-Rec. switch is inoperative.

(6) Connect the power cord to a 115 volt, 50/60 cycle A.C. source of supply. In installations where the source is 220/240 volts a few changes are required to convert the NC-183D to accept this supply. These changes are made directly on the power transformer terminal lugs and are as follows:

(a) Remove the jumper between terminals 4 and 6, and between 5 and 7.

(b) Connect a jumper between terminals 5 and 6. A drawing of both possible primary circuits is shown on the Schematic Diagram.

(7) Set the controls as recommended in Section 3 for reception of signals.

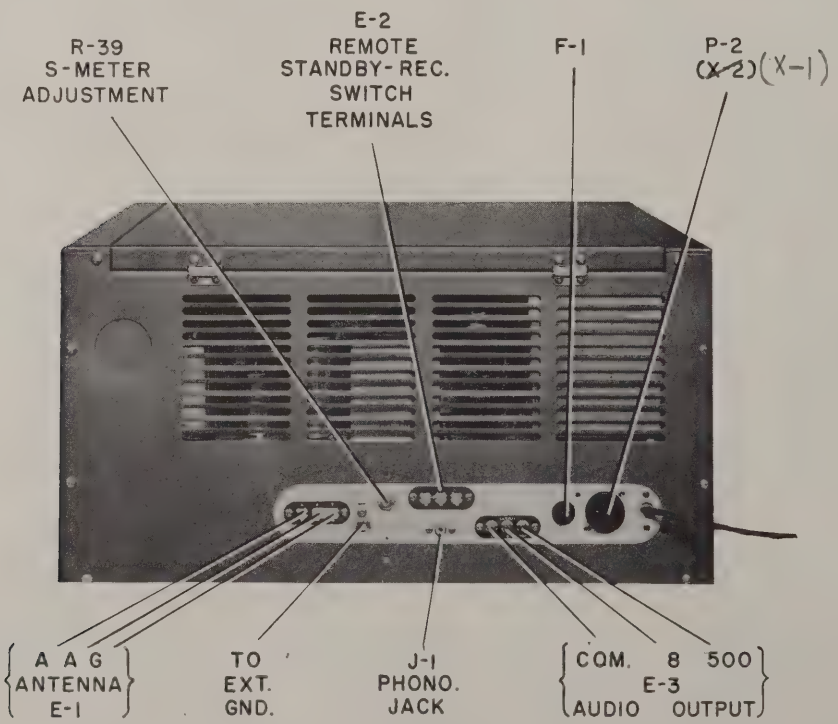


Figure No. 6. Rear View of Receiver

NOTE

Where the receiver is located in the field of a relatively powerful transmitter, it is advisable to provide some means of preventing damage to the receiver antenna coil. If a separate receiving antenna is used, a means for disconnecting or grounding the antenna during transmission periods should be provided.

2–4. BATTERY OPERATION

The NC-183D may be operated in portable or emergency service by connecting batteries to the terminals of the power socket X-1 located at the rear of the receiver. An octal plug, similar to the A.C. jumper plug, may be wired and used for interconnection between batteries and receiver. The battery plug used must be wired in accordance with the drawing shown on the Schematic Diagram. A 6 volt heater supply (storage battery) should be connected to terminals 3 and 5 and 135 to 250 volt 'B' supply connected to terminals 4 and 8. The recommended 'B' voltage supply for battery economy is between 135 and 180 volts. At voltages between 135 and 150 the voltage regulator tube will not ignite affecting a further battery economy. For stand-by operation in all cases it is recommended that a switch be placed in the battery B plus lead for increased battery economy as the 'B' switch on the receiver does not open the B supply circuit to the first and second converters, voltage regulator, phase inverter, C.W. oscillator and push-pull audio output tubes. A suggested refinement is to include a switch in the A plus lead so that the tube heaters may be turned off when the receiver is not in use without the necessity of removing the battery plug from the battery socket.

2–5. ACCESSORY SOCKET

An octal type socket is mounted on the top of the receiver chassis to accomodate such accessories as the National type NFM-83-50 or Select-O-Ject SOJ-3. Refer to the back of the manual for installation instructions for these units.

Reference to the schematic diagram will show the various connections made to the socket if it is desired to use the voltages available for accessories other than the SOJ-3 and NFM-83-50. It will be noted that B+ (260 V.D.C.) and filament voltages are available. There is a definite limitation on the drain permissible at this socket. The total permissible drain (if the NFM-83-50 and SOJ-3 are not used) is 0.6 amps at 6.3 V.A.C. and 10 milliamperes at 260 V.D.C.

SECTION 3. OPERATION

3–1. CONTROLS

All controls are identified by front panel markings for ease of identification. The controls are located in a symmetrical manner and are arranged for ease of operation.

The five positions of the Band Switch are marked with identifying band letters plus numerical identification of the Amateur bands covered on the Bandspread dial scale. These identifying markers correspond to the markers on the dial scale escutcheons. The Band Switch does not have any limit stops so that band changing may be accomplished with a minimum of Band Switch turning.

The General Coverage dial knob operates the main tuning capacitor and turns the main dial scale through a combination pinch drive and anti-backlash gear train. The main dial has five scales; four of which are calibrated directly in frequency, the other having a 0-200 linear scale for auxiliary logging purposes. The main dial escutcheon is marked with frequency limits in megacycles and band letter designations identifying each scale on the dial.

The Bandspread tuning dial knob operates the bandspread tuning capacitor and turns the bandspread dial scale through a combination pinch drive and anti-backlash gear train which is similar to that used for general coverage tuning. The bandspread dial has six scales; five of which are calibrated in frequency for the 6, 10-11, 15, 20, 40 &

and 80 meter Amateur bands, the other having a 0-200 linear scale for bandspread logging on other than the frequency calibrated bandspread frequencies. The bandspread dial escutcheon is marked with identifying band letters and amateur band designation for each scale.

The Trimmer control operates a tuning capacitor which is connected across the first R.F. amplifier section of the main tuning capacitor. The Trimmer control is used to tune the first R.F. amplifier stage properly under a wide varietyof antenna loading conditions.

The R.F. Gain control adjusts the amplification of the R.F. and I.F. amplifier stages. Clockwise rotation of the control (towards 10) increases receiver gain.

The A.F. Gain control adjusts the amount of audio voltage applied to the first audio tube. Clockwise rotation of the control (towards 10) increases the audio output power of the receiver. The A.F. Gain control is operative when an audio signal is applied to the Phono input jack. The A.C. Power switch is associated with the A.F. Gain control and A.C. power is turned On as the A.F. Gain control is advanced from A.C. Off to 0 on the scale

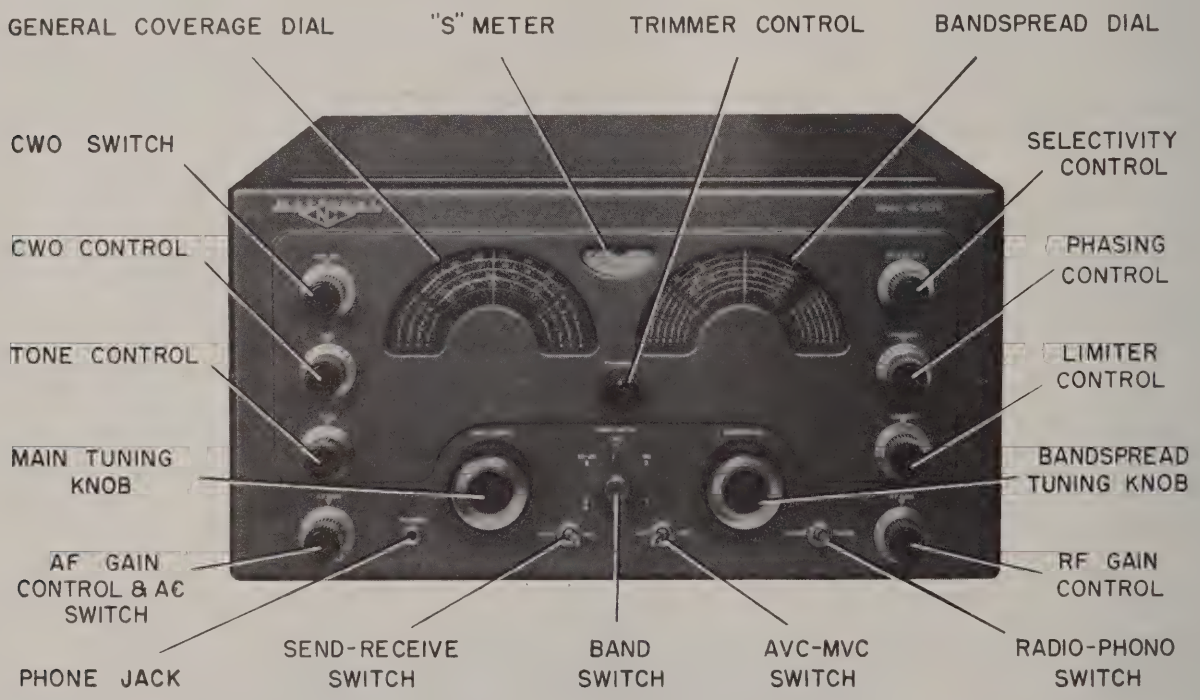


Figure No. 7. Front View of Receiver, Front Panel Control Identification

The Limiter control is used to switch the limiter into the circuit and also to adjust the threshold at which limiting action starts. The limiter is turned On as the Limiter control is advanced from Off to 0 and the threshold is lowered as the control is advanced towards 10. Any noise peak voltages in excess of this adjustable threshold are prevented from reaching the audio amplifier. The limiter circuit is the double-diode type and is equally effective for both phone or code reception.

The Tone control is used to vary the frequency characteristics of the audio output of the receiver. Turning this control towards 0 on its scale increasingly attenuates the higher frequencies.

The C.W.O. switch and C.W.O. control are only used for the reception of radiotelegraph code signals. The C.W.O. switch is used to turn the C.W. oscillator On and the C.W.O. control is used to adjust the pitch of the C.W. note. At zero on the C.W.O. scale the C.W. oscillator is tuned to the intermediate frequency of the receiver.

The Phasing and Selectivity controls adjust the operation of the crystal filter. Receiver selectivity is made

progressively sharper as the Selectivity control is turned from Off towards 5 on its scale. The Phasing control is inoperative with the Selectivity control in the Off position. The Phasing control is used to attenuate interfering signals and is connected in a bridge circuit so that the bridge can be balanced to reject the undesired signal.

The St'by-Rec. switch is used to quiet the receiver during transmission periods or other times when it is desirable to resume reception immediately (not having to wait for the tubes to warm up). The St'by-Rec. switch is connected in the B plus circuit. See Section 2–4 for use of this switch in battery operation. The St'by-Rec. switch should not be used to shut down the receiver. To shut off the receiver turn the A.F. Gain control to the A.C. Off position.

The A.V.C.-M.V.C. switch is used to adjust the receiver for either automatic volume control or manual volume control operation. Automatic volume control can be used for either phone or code reception. The A.V.C. time constants have been adjusted so that receiver gain does not change appreciably during average code speed reception.

The Radio-Phono switch is set at the Phono position when it is desired to use the audio system of the NC-183D in the event a record player or similar apparatus is connected to the Phono Input jack. In the Phono position all receiver circuits but the audio are rendered inoperative; the Audio Gain and Tone controls remain operative. If it is so desired the record player may remain connected to the receiver and normal receiver operation resumed by setting the Radio-Phono switch at Radio.

A screwdriver-adjust control, marked Meter, at the rear of the receiver is provided to allow the operator to adjust the electrical zero setting of the S-Meter. The S-Meter is calibrated at National laboratories so that approximately 15 microvolts equals S-9 and roughly 2,000 microvolts equals 40 db above S-9.

3–2. PHONE RECEPTION

After the equipment is properly installed as outlined in Section 2–3, it is placed in operation for the reception of phone signals by adjusting the receiver controls as follows:

1. Set the St'by-Rec. switch at Rec.
2. Set the A.V.C.-M.V.C. switch at A.V.C.
2. Set the Radio-Phono switch at Radio.
4. Turn the C.W.O. switch to Off.
5. Set the Selectivity control at Off.
6. Set the Phasing control at 0.
7. Set the Limiter control at Off.
8. Advance the R.F. Gain control to 10.
9. Turn the A.F. Gain control from the A.C. Off position to the point providing the desired audio volume.
10. Adjust the Tone control to give the desired audio characteristic.

The receiver is now adjusted for the reception of phone signals and will tune to the frequency indicated by the tuning dial and band switch settings. Set the Trimmer control for maximum S-Meter reading after the desired station has been selected, or alternately in the absence of a signal the Trimmer may be set for maximum receiver background noise.

The tuning system of the NC-183D is arranged for ease of operation and accuracy of calibration. However, it is necessary that the proper settings of the General Coverage and Bandspread dials be observed to maintain accuracy of calibration. For all general coverage tuning, the Bandspread dial must be at the 'Set' mark appearing at approximately 180 on the linear scale. For bandspread tuning the General Coverage dial must be set at the proper point corresponding to the Amateur band being tuned. The various 'set points' are marked directly on the General Coverage dial scale and are clearly indicated by a circular marker around the red numeral containing the Amateur band designation. The following table lists the location of the General Coverage dial settings for bandspread tuning of the Amateur bands:

AMATEUR BAND	GENERAL COVERAGE DIAL SETTING
6	198 on linear scale
10-11	30.0 Mc.
15	21.5 Mc.
20	14.4 Mc.
40	7.3 Mc.
80	4.0 Mc.

Tuning of the 6 meter band is accomplished by use of the Bandspread dial only.

The Band Switch setting determines the band of frequencies which the receiver will tune at any one time.

With the A.V.C.-M.V.C. switch set at the A.V.C. position, the R.F. Gain control should be advanced as far as receiving conditions permit. However, if background noise proves objectionable, the R.F. Gain control may be retarded to approximately 6 or 7 to reduce the level of background noise. The operator must remember that automatic volume control action will be restricted unless the R.F. Gain control is fully advanced. Audio output should be adjusted entirely by means of the A.F. Gain control.

The A.V.C.-M.V.C. switch may be set at the M.V.C. position to provide increased sensitivity in some cases. With such a setting the operator must be careful not to advance the R.F. Gain control to a point where I.F. or audio amplifier overload occurs. Such overload is indicated by distortion. In this case, the A.F. Gain control may be set at a fixed position, approximately 5, and the R.F. Gain control used to adjust the audio volume.

If a signal is weak and partially obscured by background noise and static, best signal-to-noise ratio will be obtained by turning the Tone control toward 0 on its scale. The most effective setting must be determined by trial as too much attenuation of the higher audio frequencies may not prove desirable.

When a signal is accompanied by static peaks or noise pulses of high intensity and short duration, the best-signal-to-noise ratio will be obtained by turning the Limiter control On and advancing it as necessary. The optimum setting can only be determined by trial as too much limiter action may impair the audio quality.

The Selectivity of the receiver is adjusted by means of the crystal filter Selectivity control. The normal setting of the Selectivity control in phone reception is at one of the positions affording broad selectivity. Positions marked Off, 1 or 2 are recommended. Selectivity may be progressively increased by turning the Selectivity control to positions 3, 4 or 5. The evidences of increasing selectivity will be the attenuation of the higher frequency audio tones of the signal as well as sharper tuning. Increasing selectivity too much will attenuate these higher tones to such an extent that phone signals may become unintelligible.

The Phasing control is part of the crystal filter and is used to eliminate or attenuate interfering heterodynes. The Phasing control is inoperative with the Selectivity control in the Off position but is operative at all other Selectivity control settings. The normal setting of the Phasing control, with the crystal filter On (Selectivity control at 1, 2, 3, 4 or 5), in phone reception is at 0 on the scale. If, after a signal has been tuned in, an interfering signal causes a heterodyne or whistle the Phasing control should be adjusted until interference is reduced to a minimum. The setting of the Phasing control which provides maximum attenuation of the heterodyne will depend on the pitch of the heterodyne whistle. If the heterodyne is below 1,000 cycles, the optimum Phasing control setting will be near one end of the scale or the other, depending upon whether the interfering signal has a higher or lower frequency than the desired signal.

3–3. CW RECEPTION

The receiver is placed in operation for the reception of C.W. signals in the same manner as that outlined for phone reception (Section 3–2) except that the C.W.O. switch should be set at On and the C.W.O. control set at mid-scale. The C.W. code characters are made audible by the heterodyning action of the C.W. oscillator with the incoming signal. The frequency of the C.W. oscillator can be varied by rotation of the C.W.O. control.

The sensitivity of the receiver should be adjusted by means of the R.F. Gain control and the audio volume by means of the A.F. Gain control. When receiving C.W. characters with slow keying or long pauses during keying it may be desirable to set the A.V.C.-M.V.C. switch at M.V.C. so that the receiver gain does not change during keying pauses. In this case, the A.F. Gain control should be set at a fixed position, approximately 5, and the audio volume adjusted by means of the R.F. Gain control. In either of the above cases care should be taken not to advance the R.F. Gain control to a point where I.F. or audio amplifier overload occurs.

The action of the Tone and Limiter controls will be similar to that described in Section 3–2. However, in C.W. reception it will be possible to advance these controls considerably further than is desirable in phone reception since any impairing of audio quality is relatively unimportant.

Turning the C.W.O. control to either side of zero will change the characteristic pitch of the receiver background noise thus providing a means of adjusting the audio beat note to the operator's perference. The pitch will become higher as the C.W.O. oscillator is detuned form the I.F. amplifier.

Crystal filter operation for C.W. reception is similar to that described for phone reception (Section 3–2) with the exception that it is possible to utilize maximum selectivity without the loss of audio quality experienced in phone reception. When maximum selectivity is employed, i.e., Selectivity control at 5, tuning is very critical and care must be taken to assure proper tuning. When tuning across the carrier of a received signal the audio beat note is very sharply peaked at a definite audio frequency. The maximum response indicates the proper dial setting. The pitch of the beat note peak may be adjusted by use of the C.W.O. control to provide an audio tone pleasing to copy. With the receiver tuned to 'crystal peak' an interfering signal may be attenuated by proper setting of the Phasing control since this control does not appreciably affect the desired signal.

A distinct advantage in the reception of weak C.W. signals through interference can be realized by use of the 'single-signal' properties of the NC-183D receiver. The C.W. oscillator should be detuned until the pitch of the receiver background noise is roughly 2,000 cycles. Under this condition the audio beat note of any C.W. code signal will show a broad peak in output at approximately 2,000 cycles. This peak is easily found by rotating the tuning dial slowly through the carrier of a received signal. This peak will appear on one side of 'zero beat' only and on the other side of 'zero beat' the 2,000 cycle note will be considerably weaker. It should be noted that depending on the frequency of the interfering signal better receiving conditions will be obtained by detuning the C.W.O. on one side of zero rather than on the other. The best setting of the C.W.O. control can only be determined by trial settings on either side of zero until optimum results are obtained.

3–4. MEASUREMENT OF SIGNAL STRENGTH

The S-Meter in the NC-183D receiver furnishes a means for the measurement of signal strength of incoming phone or code signals. To utilize the S-Meter the following control settings must be observed: R.F. Gain at 10, A.V.C.-M.V.C. at A.V.C. and Selectivity at Off. The Trimmer control should be adjusted for maximum S Meter reading after a signal has been tuned in. All other control settings will not affect the S-Meter readings.

In instances where a strong signal causes the S-Meter to read off-scale the S-Meter sensitivity may be lowered by retarding the R.F. Gain control until an on-scale reading is obtained. Without disturbing the setting of the R.F. Gain control the comparative strength of this strong signal may be compared with other signals.

SECTION 4. SERVICE AND TEST DATA

4–1. TUBE FAILURES

The partial or complete failure of a vacuum tube in the receiver may reduce the sensitivity, produce intermittent operation, or cause the equipment to be completely inoperative. If tube failure is suspected all tubes should be checked in suitable tube testing equipment, or by replacement with tubes of proven quality. Care should be taken that any tubes removed for checking purposes be returned to their original sockets thereby reducing the necessity for realignment.

Tubes of the same type will vary slightly in their individual characteristics and this fact should be borne in mind when replacements become necessary. The converter and I.F. tubes should be chosen with care to select a replacement which most nearly approaches the characteristics of the original tube. A replacement first converter tube can be readily checked by noting any change in dial calibration, particularly in the amateur bandspread bands. Substitution of new I.F. amplifier tubes may possibly alter overall gain and selectivity characteristics. Instructions for realignment are given in detail in Section 5-2.

4–2. CIRCUIT FAILURES

All component parts in the NC-183D Receiver have been carefully selected to assure an ample factor of safety. Failure may occur in individual cases and the most common, excluding tubes, will probably be due to breakdown of a capacitor or resistor. Measurement of voltages in accordance with Section 4–4 will most likely indicate where failure has occurred. A bypass capacitor which has failed may cause overload of associated resistors. These resistors should be checked for any change in resistance value. An overloaded or shorted resistor will sometimes be evidenced by scorching or discoloration on the surface of the resistor. An open capacitor, often the cause of oscillation or loss of sensitivity, may be checked by temporarily connecting a good capacitor across it. Intermittently poor connections can usually be located by lightly tapping each part with a piece of insulating material.

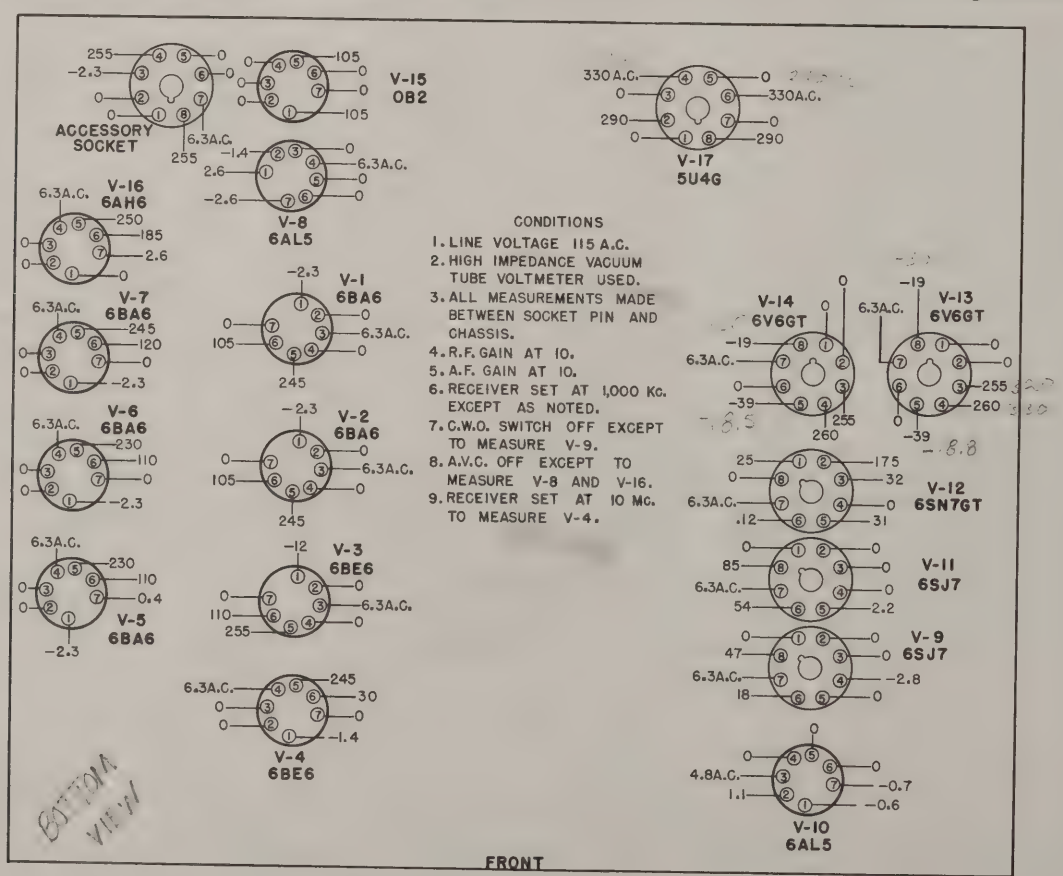


Figure No. 8. Tube Socket Voltages

4–3. STAGE GAIN MEASUREMENTS

The sensitivity measurements listed below are made with the receiver set up as specified in Section 3–2 except that the A.V.C.-M.V.C. switch must be set at M.V.C. and the R.F. and A.F. Gain controls at 10. An output meter with an impedance to match the receiver output circuit (8 or 500 ohms) should be connected to the audio output terminal, E-3, in place of the loudspeaker. It is important that the proper output impedance matching be observed i.e.,. 8 or 500 ohms, between the output meter and receiver.

The high output lead of a signal generator should be connected through a 0.1 capacitor to the pin of the tube as specified in the following table and the ground lead connected to the receiver chassis. Adjust the frequency control on the signal generator above and below the frequency value specified in the table to deliver a modulated test signal providing maximum output at the audio output terminals.then adjust the voltage output of the generator to obtain a 1 watt reading on the output meter.

The Band Switch and Main Tuning dial should be set as specified in the following table, and the Bandspread dial at the SET mark. The test signal should be within the limits specified in the table below:

TUBE	TERMINAL	MAIN TUNING DIAL SETTING	FREQ. OF GEN.	TEST SIGNAL VOLTAGE	BAND SWITCH SETTING
1st. Conv. V-3	Pin 7	8 Mc.	1720 kc.	70 Microvolts ±15	C
2nd. Conv. V-4	Pin 7	8 Mc.	1720 Kc.	84 Microvolts ±15	C
1st. Conv. V-3	Pin 7	1 Mc.	455 Kc.	70 Microvolts ±10	E
1st. I.F. Amp. V-5	Pin 1	1 Mc.	455 Kc.	380 Microvolts ±70	E
2nd. I.F. Amp. V-6	Pin 1	1 Mc.	455 Kc.	3300 Microvolts ±600	E
3rd. I.F. Amp. V-7	Pin 1	1 Mc.	455 Kc.	38000 Microvolts ±7000	E

4–4. VOLTAGE TABULATIONS

All voltage measurements should be made using a high-impedance vacuum tube voltmeter. Readings taken with any other type of instrument will differ greatly from those shown on Figure No. 8. The control settings to be observed are shown on Figure No. 8. All voltages are measured between specified terminal and chassis.

SECTION 5. ALIGNMENT DATA

5–1. GENERAL

All circuits in the NC-183D Receiver are carefully aligned, before shipment, using precision test equipment insuring close conformability to the alignment frequency. No realignment of the various adjustments will be required, therefore, unless the receiver is tampered with or damaged in transmit.

The necessity for any realignment can be determined by checking the performance of the receiver against its normal operation as outlined in Section 3. In no case should realignment be attempted unless tests indicate that such realignment is necessary. Even then, it must be remembered that the NC-183D is a communications receiver and should not be serviced or realigned by any indivudial who does not have a complete understanding of the functioning of the equipment and who has not had previous experience adjusting a similar type of receiver.

Before proceding with the alignment of any circuit in the receiver, the equipment must be set up as specified in Section 2-3, except that the antenna lead-in and loudspeaker must be disconnected.

Alignment of the equipment may be divided into two major steps:

(1) I.F. and A.V.C. Amplifier Alignment including crystal filter adjustments.
(2) General Coverage and Bandspread Alignment.
    (a) H.F. Oscillator
    (b) R.F. Amplifiers

The circuits must be tuned in the above order when complete alignment is required.

5-2. I. F. AND A.V.C. AMPLIFIER ALIGNMENT

The intermediate frequency of the NC-183D Receiver is 455 kilocycles, plus or minus 2 kilocycles. The exact frequency is determined by the quartz crystal resonator, Y-1, used in the crystal filter. The I.F. transformers, crystal filter, A.V.C. amplifier and C.W. oscillator transformers all have individual permeability-tuned iron core inductors with screw-type adjustments for alignment purposes. These adjustments are located in Figure Nos. 9 and 11.

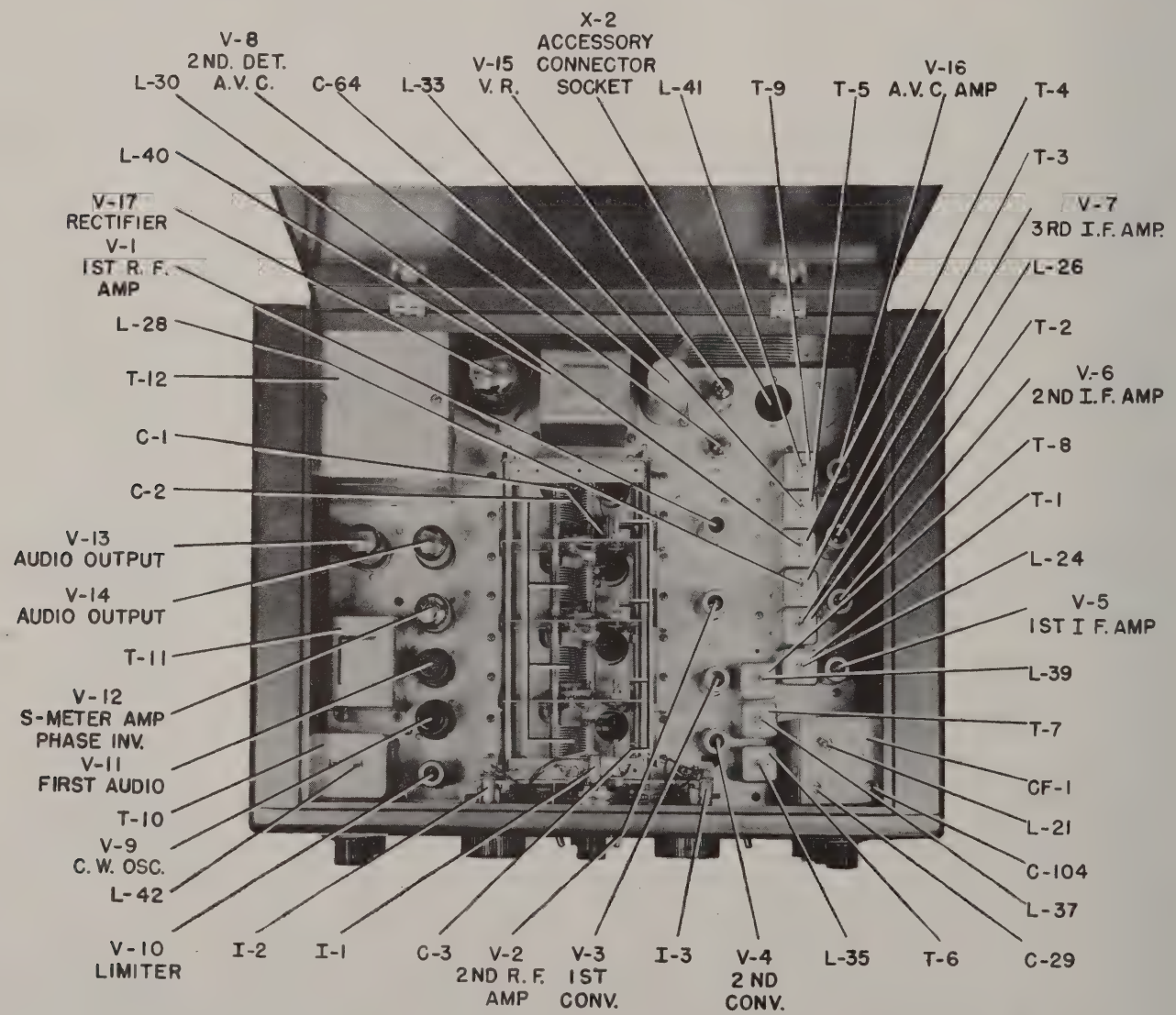


Figure No. 9. Top View of Receiver

The preliminary alignment procedure is as follows:

(1) Connect the high output lead of an accurately calibrated signal generator to the stator portion of the detector section of the main tuning capacitor, C-2C, and the grounded lead to any convenient grounded point on the chassis. This is a direct connection and no dummy antenna is required.

(2) Connect an output meter having an 8 or 500 ohm resistive load to the matching output terminals on the receiver. As an alternative a high-impedance A.C. voltmeter may be connected to the phones jack.

(3) Set the Bandswitch at E, the Bandspread tuning dial at the SET mark and the Main Tuning dial at 1000 kilocycles.

(4) Set the C.W.O. switch at On.

(5) Set the A.V.C.-M.V.C. switch at M.V.C.

(6) Set the Phasing control at 0.

(7) Set the Selectivity control at 5.

(8) Set the R.F. Gain control at 10.

(9) Set the A.F. Gain control at 10.

Turn the modulation of the signal generator Off to provide a steady C.W. test signal tuned to approximately 455 kilocycles and adjust the output attenuator to provide a readable signal voltage at the output meter i.e., approximately 100 microvolts.

The C.W.O. control must be set to provide an audible beat note at some frequency between 400 and 1000 cycles per second. The presence of this beat-note can readily be determined by temporarily connecting headphones or a loudspeaker to the receiver.

Tune for the crystal frequency by varying the tuning control of the signal generator slowly between the frequencies of 453 and 457 kilocycles. At some frequency between these limits the I.F. amplifier of the receiver will show a very sharply peaked response as indicated on the output meter. If this sharp response cannot be found it is probably due to overload. Retard the R.F. Gain control setting and/or decrease the output of the generator to overcome the overload. This frequency is that of the crystal, Y-1, and I.F. alignment, as outlined in the following steps, is made at this frequency.

While making the I.F. amplifier adjustments it will be necessary to retard the attenuator of the signal generator if I.F. amplifier gain increases to a point where overload occurs. Without altering the frequency setting of the signal generator turn the modulation On.

Set the Selectivity and C.W.O. switches at Off and carefully adjust the I.F. amplifier inductors L-24 thru L-31 and L-33 and L-34 and the inductor L-21 in the crystal filter to give a maximum reading on the output meter. The order in which these adjustments are performed is not important, however, it is preferable to start at the final I.F. amplifier and work back to the crystal filter.

Upon completion of these adjustments set the Selectivity switch at 1 and the frequency of the signal generator 2 kilocycles higher than that of the crystal frequency as previously determined. Adjust L-22 for a maximum reading on the output meter. Reset the signal generator at the exact (crystal) I.F. frequency i.e., 2 kilocycles lower, the Selectivity switch of the receiver at Off and adjust C-29 for a maximum output meter reading.

The Phasing control as set at the factory should need no further attention. When correctly set a predominant decrease in background level will be found with the Selectivity switch at position 5 and the Phasing control set at zero. This same null point should be found by rotating the Phasing control 180 degrees. If not, a slight

adjustment of the Phasing balancing capacitor, C-104, will provide the proper setting.

Set the C.W.O. switch at On and the C.W.O. control at zero. At this setting the C.W. oscillator should be at zero-beat with the test signal. If zero-beat does not occur at zero, readjust the tuneable inductor L-42 of transformer T-10 until zero beat does occur with the C.W.O. control set at 0.

To align the A.V.C. amplifier turn the A.V.C.-M.V.C. switch to A.V.C. Adjust L-41 of transformer T-9 until a well-defined dip is observed in the output meter readings. The setting of L-41 where this dip occurs will provide maximum A.V.C. action.

Set the Bandswitch of the receiver at C, the Selectivity switch at Off, the C.W.O. switch at Off and the generator frequency at 1720 kc. modulated. Connect the output lead of the signal generator to pin 7 of the second converter tube V-4 and adjust L-35 for maximum reading of the output meter. Return the output lead of the generator to the stator of C-2C and adjust L-36 thru L-39 for maximum output.

5-3. GENERAL COVERAGE AND BANDSPREAD ALIGNMENT

The data given in this section applies to the alignment of the H.F. oscillator and R.F. amplifier stages. Since the main tuning capacitor and bandspread capacitor are connected in parallel on all bands, general coverage and bandspread alignment are accomplished simultaneously. The 6 meter band is tuneable by Bandspread tuning only.

The original alignment at National Laboratories is accomplished by the use of precision crystal-controlled test oscillators. No realignment of the general coverage ranges should be attempted unless a test signal source with an accuracy of better than 1% is available. For bandspread ranges the test signal source must have an accuracy of precision calibrated crystals.

The need for realignment of the general coverage ranges is indicated when the frequency calibration of the receiver is in error by more than 1% at the high frequency end of any one band. Realignment of the bandspread ranges is required when a calibration error of 0.2% is evidenced. Particular care should be taken when adjusting the high frequency oscillator coil trimmers. It is imperative that the high frequency oscillator is set to operate at a frequency above the first converter and R.F. amplifier frequency and not below. This can be checked by tuning in the image signal which should appear 3440 kilocycles lower on the receiver dial on bands A, B and C. The image on the D and E bands should appear 910 kilocycles lower on the receiver dial. If it is found that the image signal does not appear at this setting the H.F. oscillator is incorrectly adjusted and the capacity of the H.F. oscillator trimmer must be decreased until the image and fundamental signals appear at the correct setting.

Complete alignment procedure is given on the alignment Chart. In general, the H.F. oscillator is correctly calibrated and then the first detector and R.F. amplifier stages are adjusted for maximum receiver gain as indicated on the output meter. Each band has a capacitor trimmer for calibration adjustment at the high end of the band. Bands A, B, C,and D each have an inductance adjustment and Band E has a capacitor trimmer for oscillator alignment at the low frequency check point of these bands. The tracking of the first detector and R.F. amplifier stages is checked by inserting a tuning wand into the opening of the coil form under test. Receiver gain should decrease on insertion of the iron or brass end of the tuning wand to indicate correct tracking. The tracking of the first R.F. amplifier stages is checked by rotating the Trimmer control. If two definite peaks in output are observed while rotating the Trimmer control, the first R.F. amplifier stage is tracking correctly and the Trimmer setting at either peak is correct. The lack of a peak in output or the presence of only one peak indicates the stage is not tracking properly and correction should be made.

The locations of the adjustments referred to on the Alignment Chart are shown on Figure No. 10.

The control settings used for alignment are as outlined in Section 3-2 except that the A.V.C.-M.V.C. switch should be set at M.V.C. The following Alignment Chart gives the step by step procedure to follow in effecting alignment of each band. It is important that the chart of adjustments is adhered to in the order shown for each band.

Step	Band	Adjust Signal Source To:	Set Gen. Cov. Dial at:	Set Bandspread Dial at:	Adjust to Receive Test Signal	Adjust for Maximum Output
1	A	53 Mc.	6 (198 on linear scale)	53 Mc.	C-67	C-16, C-7, C-1
2	A	50 Mc.	6	50 Mc.	L-16	L-11, L-6
3	A	53 Mc.	6	53 Mc.	C-67	Check Step 1. Repeat Steps 1, 2 and 3 if necessary.
1	B	30.0 Mc.	30.0 Mc.	Set Mark	C-69	C-17, C-9, C-1
2	B	14.0 Mc.	14.0 Mc.	Set Mark	L-17	L-12, L-7, L-2
3	B	30.0 Mc.	30.0 Mc.	Set Mark	C-69	Check Step 1. Repeat Steps 1, 2 and 3 if necessary.
1	C	11.0 Mc.	11.0 Mc.	Set Mark	C-71	C-18, C-10, C-1
2	C	5.0 Mc.	5.0 Mc.	Set Mark	L-18	L-13, L-8, L-3
3	C	11.0 Mc.	11.0 Mc.	Set Mark	C-71	Check Step 1. Repeat Steps 1, 2 and 3 if necessary.
1	D	4.0 Mc.	4.0 Mc.	Set Mark	C-73	C-19, C-11, C-1
2	D	1.8 Mc.	1.8 Mc.	Set Mark	L-19	L-14, L-9, L-4
3	D	4.0 Mc.	4.0 Mc.	Set Mark	C-73	Check Step 1. Repeat Steps 1, 2 and 3 if necessary.
1	E	1.5 Mc.	1.5 Mc.	Set Mark	C-76	C-20, C-12, C-1
2	E	1.0 Mc.	1.0 Mc.	Set Mark	L-20	
3	E	0.6 Mc.	0.6 Mc.	Set Mark	C-74	
4	E	1.5 Mc.	1.5 Mc.	Set Mark	C-76	Check Step 1. Repeat Steps 1, 2, 3 and 4 if necessary.

Note: Inductance adjustments (indicated by 'L') consists of a loop of wire inside coil form -- bending the loop one way or the other adds or subtracts to the inductance. L-20 inductance is adjusted by shorted turn loop on outside of coil form.

The Set Mark referred to above is located at 180 on the linear scale.

5–4. S-METER ADJUSTMENT

The S-Meter adjusting resistor R-39 is sued to obtain a zero reading with no signal input to the receiver. To make this adjustment set controls as follows: R.F. Gain control at zero, A.V.C.-M.V.C. switch at A.V.C., the A.C. switch at On and the St'by-Rec. switch at Rec. Adjust R-39 for a zero reading on the meter. This is a screwdriver type adjustment located at the rear of the receiver

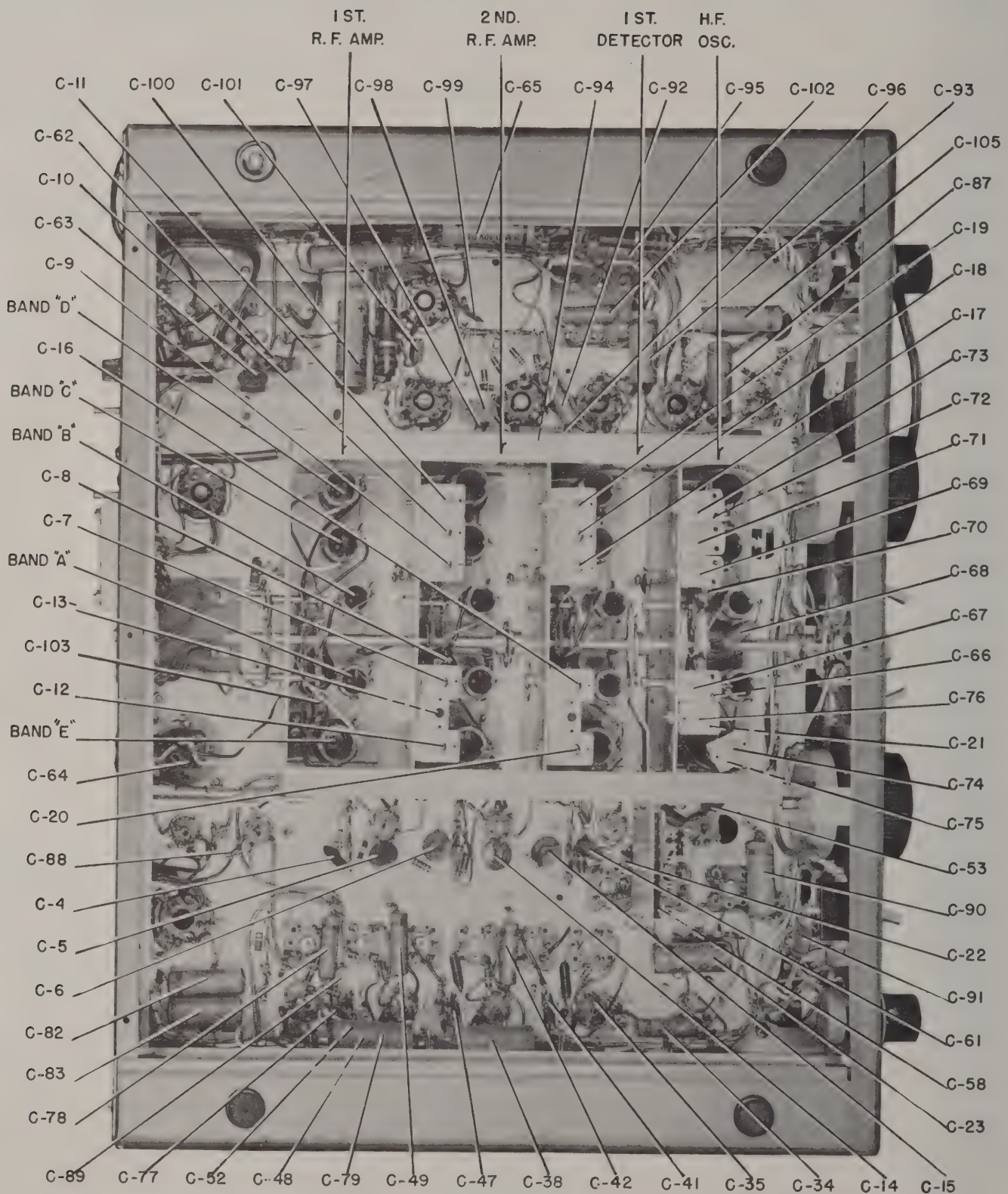


Figure No. 10. Capacitor Locations, Bottom View of Receiver

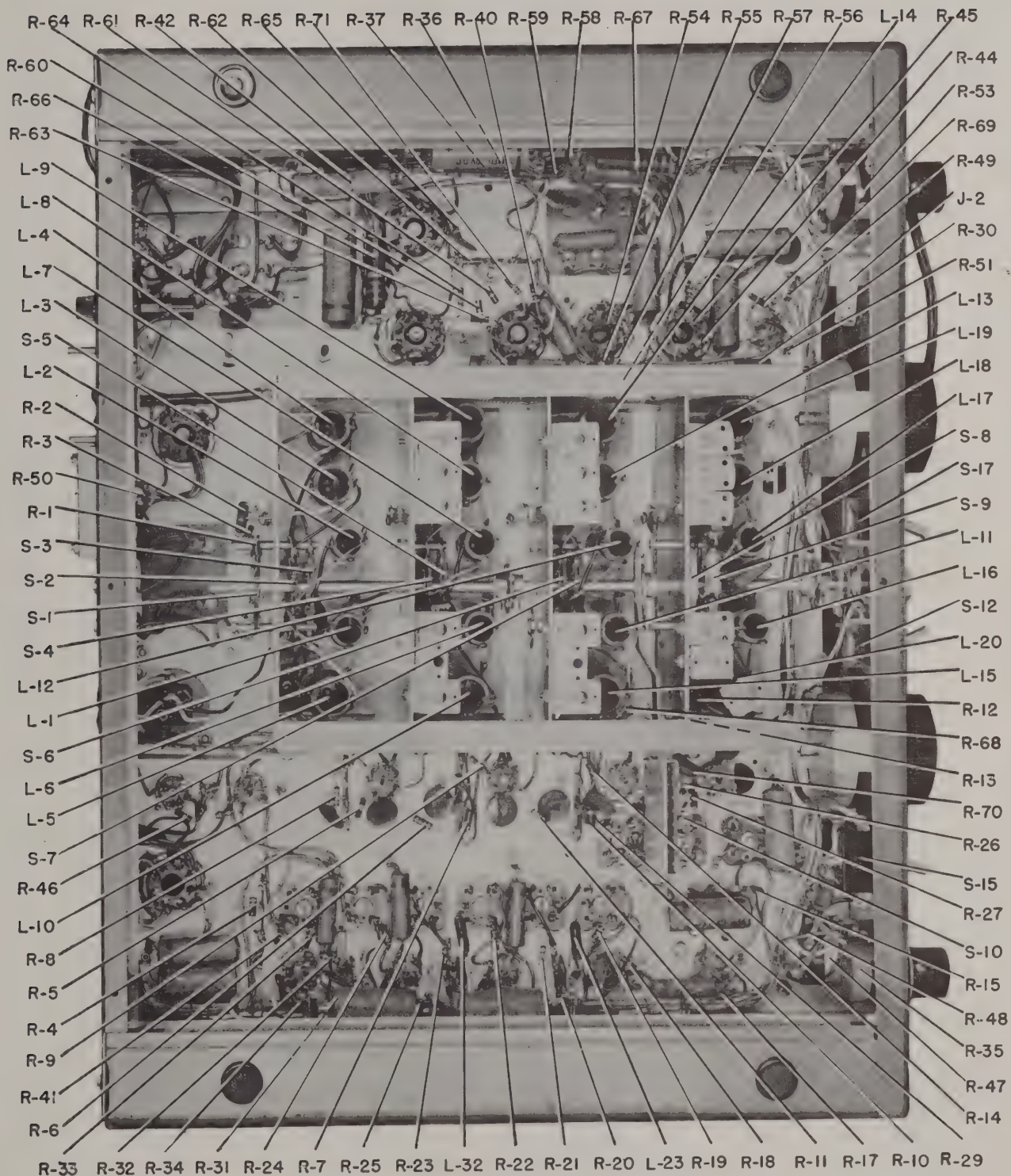


Figure No. 11. Resistor and Miscellaneous Component Locations, Bottom View of Receiver

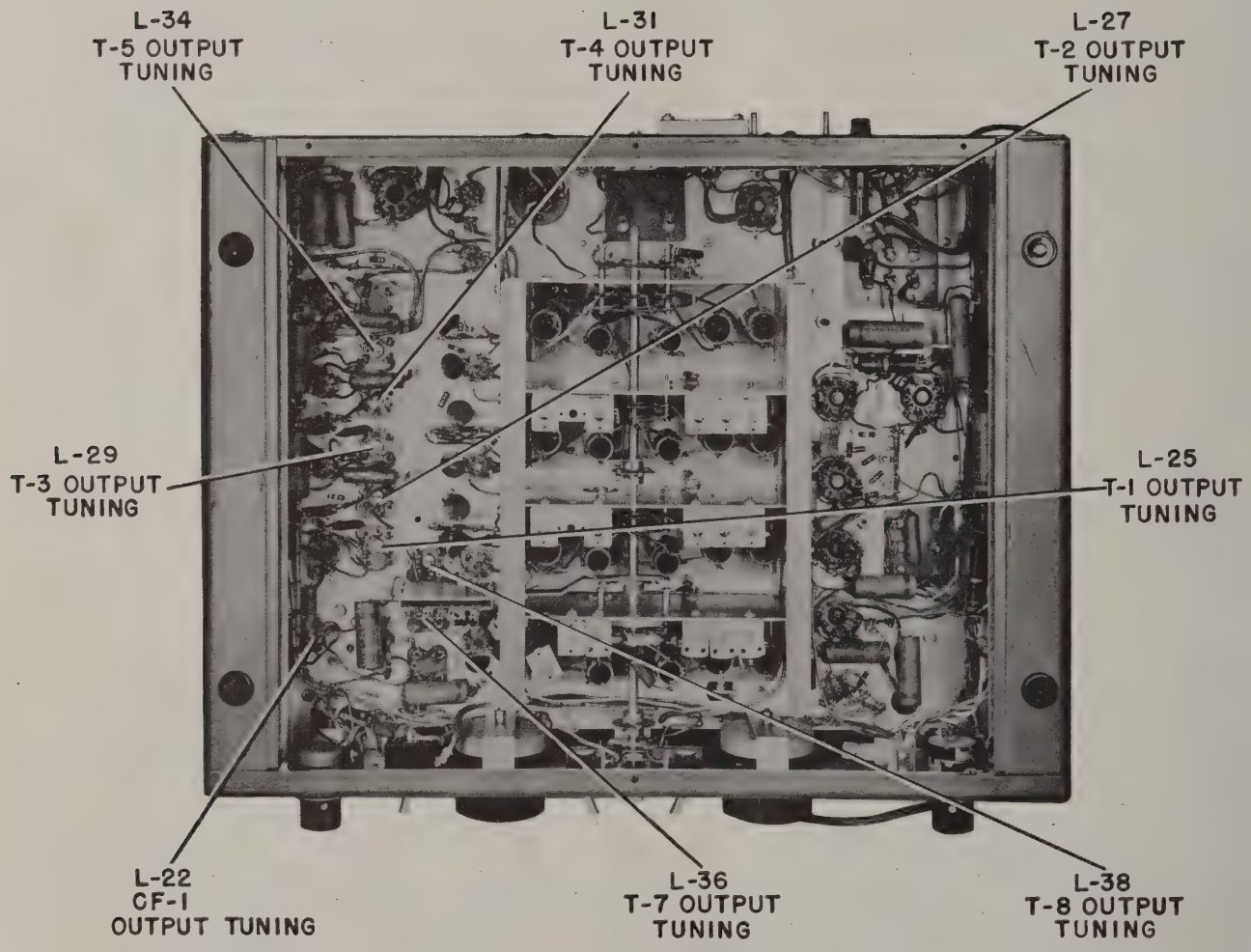
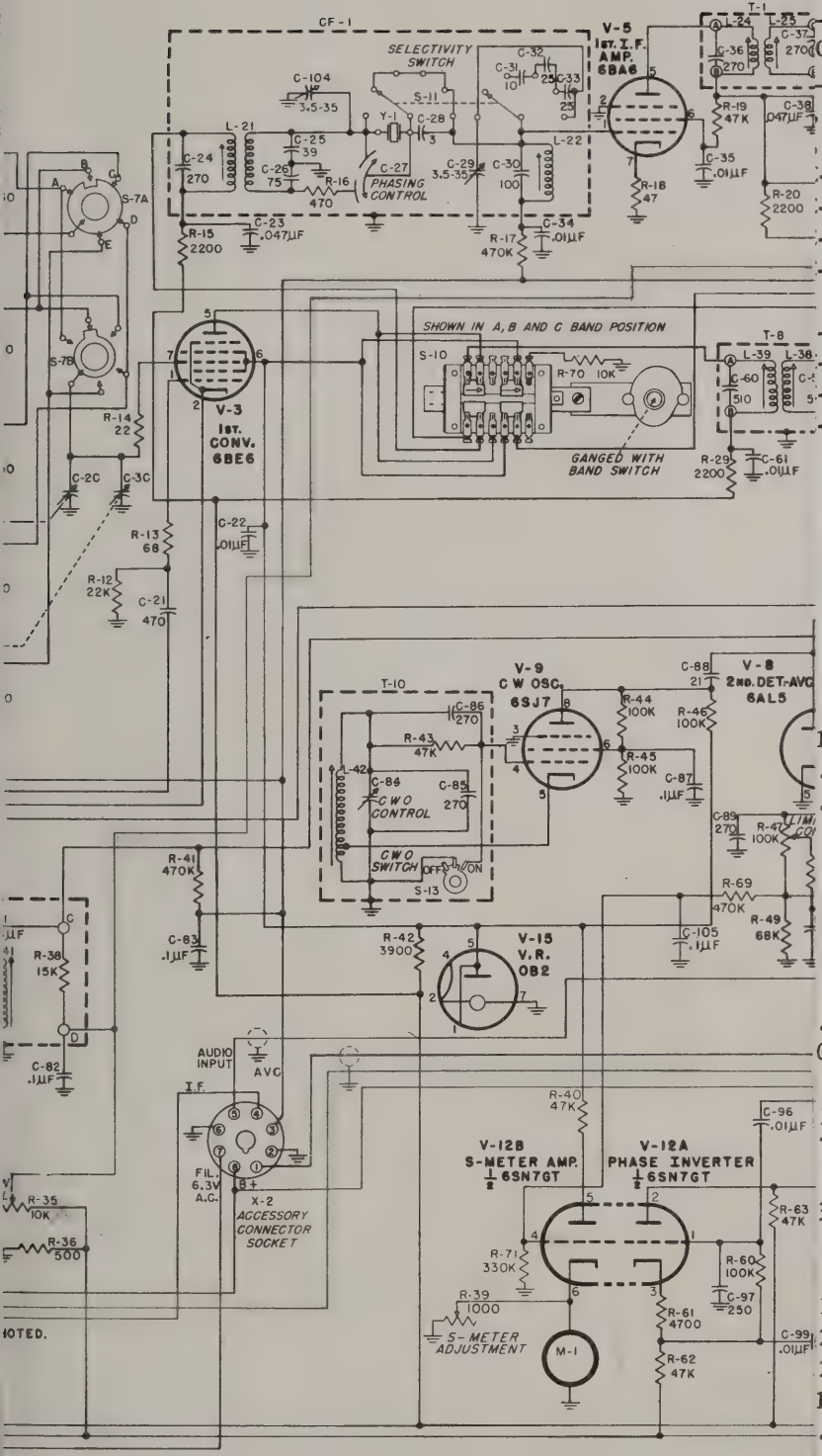


Figure No. 12. Alignment Locations, Bottom of Receiver



.IST

DESCRIPTION	DRAWING NO.
ORS	
air dielectric, 3-40 mmf.	SA:9988
air dielectric, 4 section	SA:9342
-2	
-2	
-2	
-2	
air dielectric, 4 section	Part of C-2
-3	
-3	
-3	
-3	
.01 mfd. 450 vdcw	K946-2
.01 mfd. 450 vdcw	K946-2
.01 mfd. 450 vdcw	K946-2
mica dielectric, 3-30 mmf.	J619-2
5 mmf. 500 vdcw	D825D-401
mica dielectric, 3-30 mmf.	J612-1
mica dielectric, 3-30 mmf.	Part of C-9
mica dielectric, 3-30 mmf.	Part of C-9
mica dielectric, 3-30 mmf.	Part of C-9
1 mfd. 300 vdcw	J665-71
.01 mfd. 450 vdcw	K946-2
.01 mfd. 450 vdcw	K946-2
mica dielectric, 3-30 mmf.	J619-1
mica dielectric, 3-30 mmf.	J612-1
mica dielectric, 3-30 mmf.	Part of C-17
mica dielectric, 3-30 mmf.	Part of C-17
mica dielectric, 3-30 mmf.	Part of C-17
mmf. 500 vdcw	J665-56
.01 mfd. 450 vdcw	K946-2
047 mfd. 600 vdcw	Q693-72
mmf. 500 vdcw	H500-6
39 mmf. 500 vdcw	D825D-455
75 mmf. 500 vdcw	D825C-301
air dielectric	SA:9190
3 mmf. 500 vdcw	D825D-449
mica dielectric, 3.5-35 mmf.	D832-2
mmf. 500 vdcw	H500-4
10 mmf. 500 vdcw	D825D-426
25 mmf. 500 vdcw	D825D-411
25 mmf. 500 vdcw	D825D-411
1 mfd. 600 vdcw	L217-16
.01 mfd. 450 vdcw	K946-2
mmf. 300 vdcw	S659-3
mmf. 300 vdcw	S659-3
047 mfd. 600 vdcw	Q693-72
mmf. 300 vdcw	S659-3
mmf. 300 vdcw	S659-3
.01 mfd. 450 vdcw	K946-2
1 mfd. 600 vdcw	L217-16

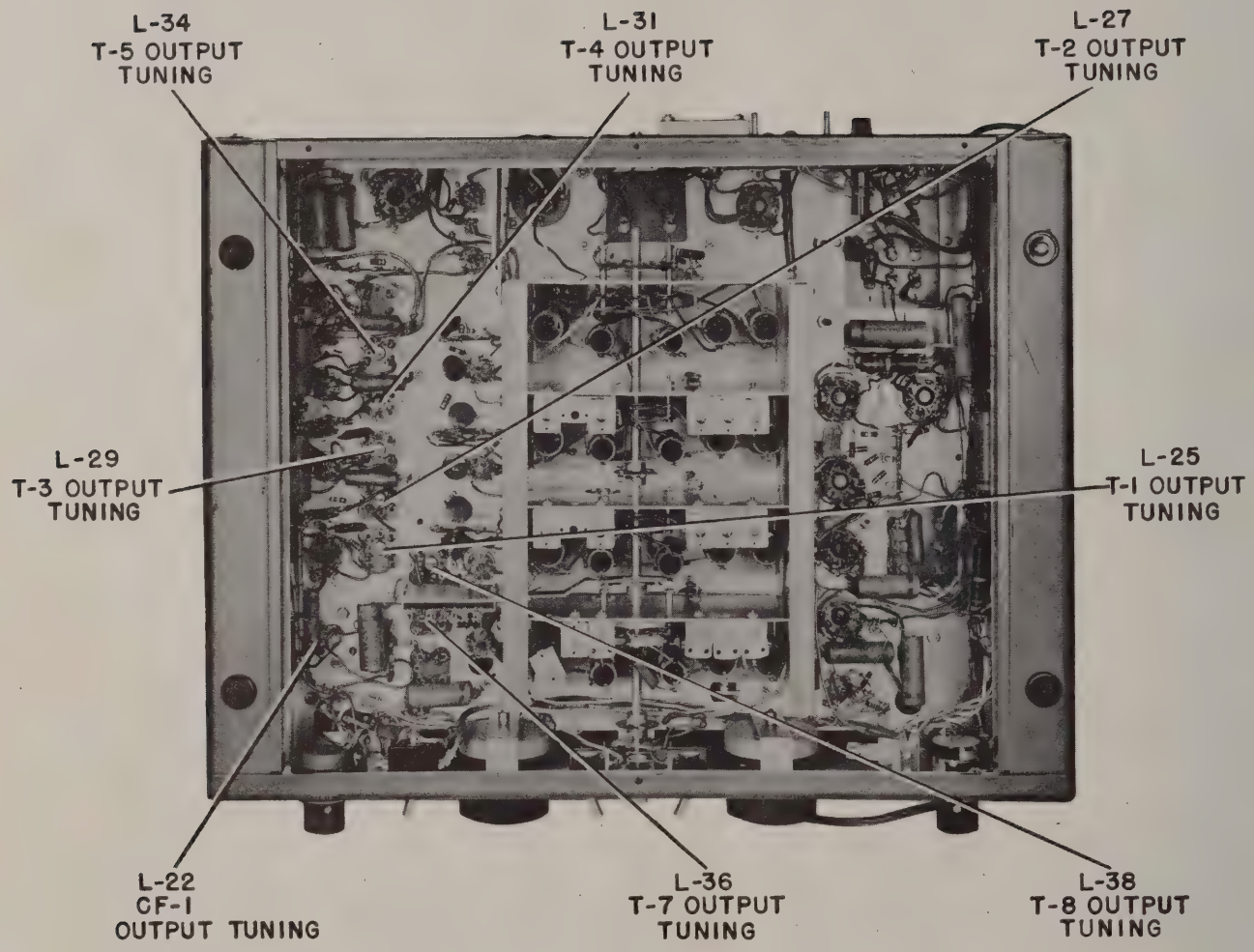


Figure No. 12. Alignment Locations, Bottom of Receiver

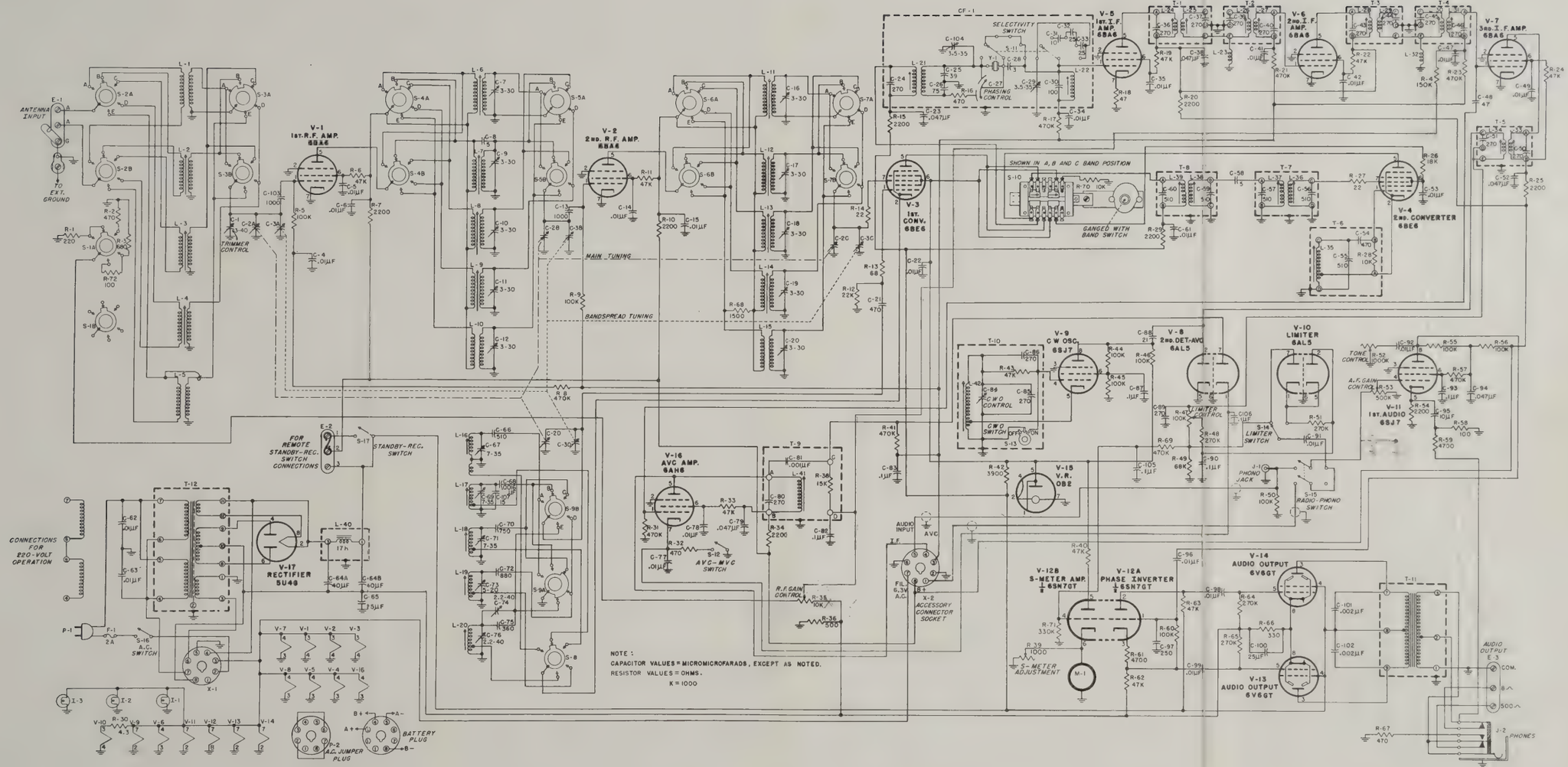
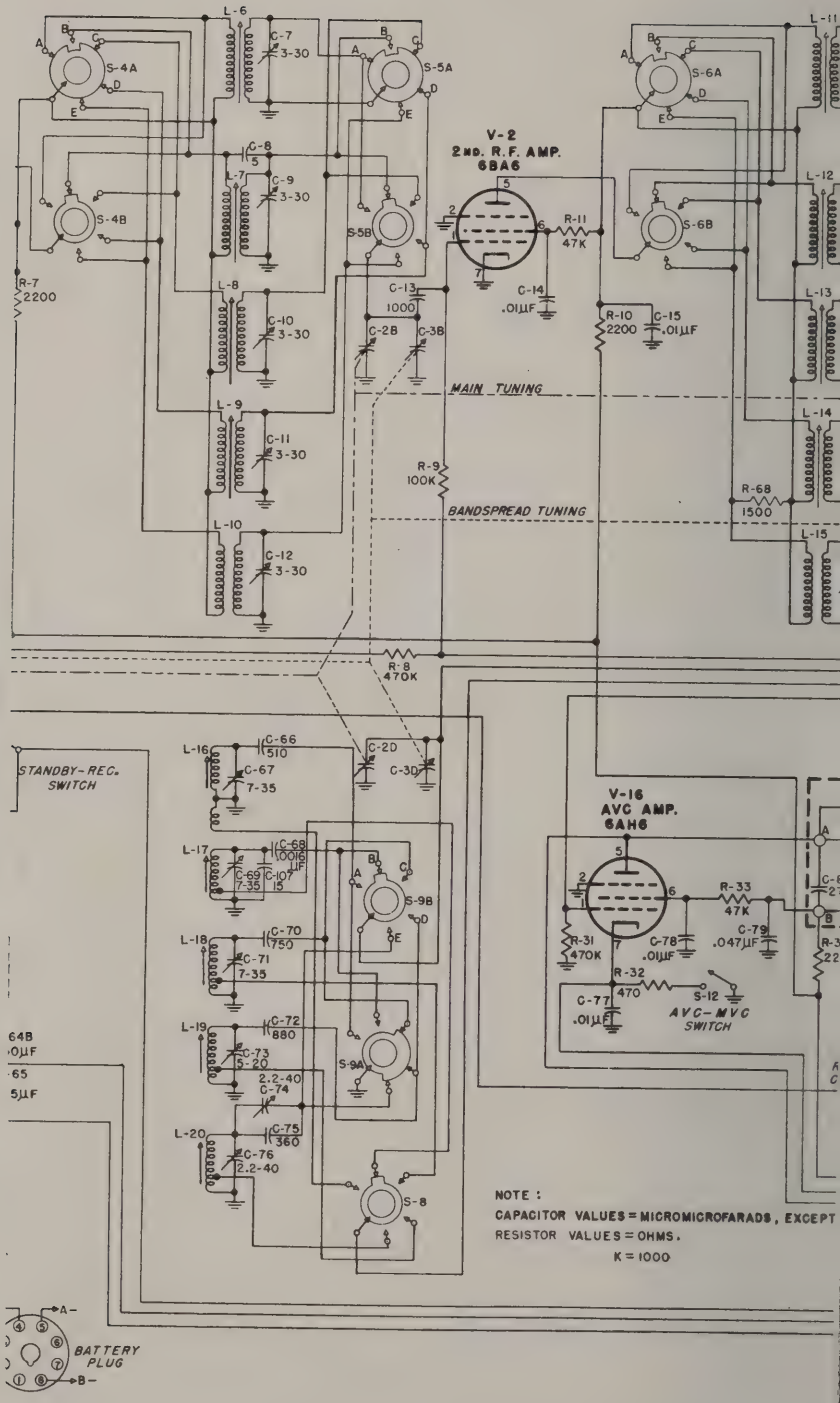


Figure No. 13. NC-183D Receiver, Schematic Diagram

PARTS LIST

SYMBOL	FUNCTION	DESCRIPTION	DRAWING NO.
		CAPACITORS	
C-1	Trimmer Control	Variable, air dielectric, 3-40 mmf.	SA:9988
C-2	Main Tuning Control	Variable, air dielectric, 4 section	SA:9342
C-2A	1st. R.F. Amp. Tuning	Part of C-2	
C-2B	2nd. R.F. Amp. Tuning	Part of C-2	
C-2C	1st. Det. Tuning	Part of C-2	
C-2D	H.F. Osc. Tuning	Part of C-2	
C-3	Bandspread Tuning	Variable, air dielectric, 4 section	Part of C-2
C-3A	1st. R.F. Amp. Bandspread Tuning	Part of C-3	
C-3B	2nd. R.F. Amp. Bandspread Tuning	Part of C-3	
C-3C	1st. Det. Bandspread Tuning	Part of C-3	
C-3D	H.F. Osc. Bandspread Tuning	Part of C-3	
C-4	A.V.C. Filter	Ceramic, .01 mfd. 450 vdcw	K946-2
C-5	V-1 Screen Bypass	Ceramic, .01 mfd. 450 vdcw	K946-2
C-6	V-1 Plate Filter	Ceramic, .01 mfd. 450 vdcw	K946-2
C-7	A Band 2nd. R.F. Trimmer	Variable, mica dielectric, 3-30 mmf.	J619-2
C-8	B Band 2nd. R.F. Coupling	Ceramic, 5 mmf. 500 vdcw	D825D-401
C-9	B Band 2nd. R.F. Trimmer	Variable, mica dielectric, 3-30 mmf.	J612-1
C-10	C Band 2nd. R.F. Trimmer	Variable, mica dielectric, 3-30 mmf.	Part of C-9
C-11	D Band 2nd. R.F. Trimmer	Variable, mica dielectric, 3-30 mmf.	Part of C-9
C-12	E Band 2nd. R.F. Trimmer	Variable, mica dielectric, 3-30 mmf.	Part of C-9
C-13	V-2 Grid Coupling	Mica, .001 mfd. 300 vdcw	J665-71
C-14	V-2 Screen Bypass	Ceramic, .01 mfd. 450 vdcw	K946-2
C-15	V-2 Plate Filter	Ceramic, .01 mfd. 450 vdcw	K946-2
C-16	A Band 1st. Det. Trimmer	Variable, mica dielectric, 3-30 mmf.	J619-1
C-17	B Band 1st. Det. Trimmer	Variable, mica dielectric, 3-30 mmf.	J612-1
C-18	C Band 1st. Det. Trimmer	Variable, mica dielectric, 3-30 mmf.	Part of C-17
C-19	D Band 1st. Det. Trimmer	Variable, mica dielectric, 3-30 mmf.	Part of C-17
C-20	E Band 1st. Det. Trimmer	Variable, mica dielectric, 3-30 mmf.	Part of C-17
C-21	V-3Grid Coupling	Mica, 470 mmf. 500 vdcw	J665-56
C-22	V-3 Screen Bypass	Ceramic, .01 mfd. 450 vdcw	K946-2
C-23	V-4 Plate Filter	Paper, 0.047 mfd. 600 vdcw	Q693-72
C-24	L-21 Primary Tuning	Mica, 270 mmf. 500 vdcw	H500-6
C-25	L-21 Secondary Tuning	Ceramic, 39 mmf. 500 vdcw	D825D-455
C-26	L-21 Secondary Tuning	Ceramic, 75 mmf. 500 vdcw	D825C-301
C-27	Crystal Filter Phasing	Variable, air dielectric	SA:9190
C-28	V-5 Grid Coupling	Ceramic, 3 mmf. 500 vdcw	D825D-449
C-29	Crystal Filter Compensating	Variable, mica dielectric, 3.5-35 mmf.	D832-2
C-30	L-22 Tuning	Mica, 100 mmf. 500 vdcw	H500-4
C-31	Selectivity Adjusting	Ceramic, 10 mmf. 500 vdcw	D825D-426
C-32	Selectivity Adjusting	Ceramic, 25 mmf. 500 vdcw	D825D-411
C-33	Selectivity Adjusting	Ceramic, 25 mmf. 500 vdcw	D825D-411
C-34	V-5 Grid Filter	Paper, .01 mfd. 600 vdcw	L217-16
C-35	V-5 Screen Bypass	Ceramic, .01 mfd. 450 vdcw	K946-2
C-36	L-24 Tuning	Mica, 270 mmf. 300 vdcw	S659-3
C-37	L-25 Tuning	Mica, 270 mmf. 300 vdcw	S659-3
C-38	V-5 Plate Filter	Paper, 0.047 mfd. 600 vdcw	Q693-72
C-39	L-26 Tuning	Mica, 270 mmf. 300 vdcw	S659-3
C-40	L-27 Tuning	Mica, 270 mmf. 300 vdcw	S659-3
C-41	V-6 Grid Filter	Ceramic, .01 mfd. 450 vdcw	K946-2
C-42	V-6 Screen Bypass	Paper, .01 mfd. 600 vdcw	L217-16


L-6
C-7 3-30
S-4A
S-5A
S-6A
V-2
2ND. R.F. AMP.
6BA6
C-8 5
L-7
C-9 3-30
S-4B
S-5B
S-6B
R-11 47K
R-7 2200
L-8
C-10 3-30
C-13 1000
C-14 .01μF
R-10 2200
C-15 .01μF
C-2B
C-3B
MAIN TUNING
L-9
C-11 3-30
R-9 100K
BANDSPREAD TUNING
R-68 1500
L-10
C-12 3-30
R-8 470K
STANDBY-REC. SWITCH
L-16
C-66 510
C-67 7-35
C-2D
C-3D
V-16
AVC AMP.
6AH6
L-17
C-68 1000 μμF
C-69 7-35
C-107 15
S-9B
R-33 47K
R-31 470K
C-78 .01μF
C-79 .047μF
L-18
C-70 750
C-71 7-35
R-32 470
S-12
C-77 .01μF
AVC-MVC SWITCH
L-19
C-72 880
C-73 5-20
2.2-40 C-74
S-9A
L-20
C-75 360
C-76 2.2-40
S-8
64B
.01μF
.65
5μF
NOTE :
CAPACITOR VALUES = MICROMICROFARADS, EXCEPT
RESISTOR VALUES = OHMS.
K = 1000
A-
B-
BATTERY PLUG

PARTS LIST (CONT'D)

SYMBOL	FUNCTION	DESCRIPTION	DRAWING NO.
C-43	L-28 Tuning	Mica, 270 mmf. 300 vdcw	S659-3
C-44	L-29 Tuning	Mica, 270 mmf. 300 vdcw	S659-3
C-45	L-30 Tuning	Mica, 270 mmf. 300 vdcw	S659-3
C-46	L-31 Tuning	Mica, 270 mmf. 300 vdcw	S659-3
C-47	V-7 Grid Filter	Ceramic, .01 mfd. 450 vdcw	K946-2
C-48	V-7 Grid Coupling	Ceramic, 47 mmf. 500 vdcw	J695-1
C-49	V-7 Screen Bypass	Paper, .01 mfd. 600 vdcw	L217-16
C-50	L-33 Tuning	Mica, 270 mmf. 300 vdcw	S659-3
C-51	L-34 Tuning	Mica, 270 mmf. 300 vdcw	S659-3
C-52	V-7 Plate Filter	Paper, 0.047 mfd. 600 vdcw	Q693-7
C-53	V-4 Screen Bypass	Ceramic, .01 mfd. 450 vdcw	K946-2
C-54	V-4 Grid Coupling	Mica, 470 mmf. 300 vdcw	S659-2
C-55	L-35 Tuning	Mica, 510 mmf. 300 vdcw	S659-1
C-56	L-36 Tuning	Mica, 510 mmf. 300 vdcw	S659-1
C-57	L-37 Tuning	Mica, 510 mmf. 300 vdcw	S659-1
C-58	T-7 to T-8 Coupling	Ceramic, 5 mmf. 500 vdcw	K940-7
C-59	L-38 Tuning	Mica, 510 mmf. 300 vdcw	S659-1
C-60	L-39 Tuning	Mica, 510 mmf. 300 vdcw	S659-1
C-61	V-3 Plate Filter	Ceramic, .01 mfd. 450 vdcw	K946-2
C-62	A.C. Line Bypass	Ceramic, .01 mfd. 450 vdcw	K946-2
C-63	A.C. Line Bypass	Ceramic, .01 mfd. 450 vdcw	K946-2
C-64		Elect., 40 + 40 mfd. 475 vdcw	K945-3
C-64A	Power Supply Filter	Part of C-64	
C-64B	Power Supply Filter	Part of C-64	
C-65	B-Minus Bypass	Elect., 25 mf. 50 vdcw	E338-4
C-66	A Band H.F. Osc. Padder	Mica, 510 mmf. 500 vdcw	H500-5
C-67	A Band H.F. Osc. Trimmer	Variable, ceramic dielectric 7-35 mmf.	E311-4
C-68	B Band H.F. Osc. Padder	Mica, .0016 mfd. 300 vdcw	J819-8
C-69	B Band H.F. Osc. Trimmer	Variable, ceramic dielectric, 7-35 mmf.	E311-4
C-70	C Band H.F. Osc. Padder	Mica, 750 mmf. 300 vdcw	J819-5
C-71	C Band H.F. Osc. Trimmer	Variable, ceramic dielectric, 7-35 mmf.	E311-4
C-72	D Band H.F. Osc. Padder	Mica, 880 mmf. 300 vdcw	J819-7
C-73	D Band H.F. Osc. Trimmer	Variable, ceramic dielectric, 5-20 mmf.	E311-2
C-74	E Band H.F. Osc. Padder	Variable, mica dielectric, 2.2-40 mmf.	D832-6
C-75	E Band H.F. Osc. Padder	Mica, 360 mmf. 500 vdcw	L479-1
C-76	E Band H.F. Osc. Trimmer	Variable, mica dielectric, 2.2-40 mmf.	D832-6
C-77	V-16 Cathode Bypass	Ceramic, .01 mfd. 450 vdcw	K946-2
C-78	V-16 Screen Bypass	Paper, .01 mfd. 600 vdcw	L217-16
C-79	V-16 Plate Filter	Paper, 0.047 mfd. 600 vdcw	Q693-72
C-80	L-41 Tuning	Mica, 270 mmf. 300 vdcw	S659-3
C-81	A.V.C. Coupling	Mica, .001 mfd. 300 vdcw	J665-71
C-82	A.V.C. Filter	Paper, .1 mfd. 400 vdcw	L217-35
C-83	A.V.C. Filter	Paper, .1 mfd. 400 vdcw	L217-35
C-84	C.W.O Control	Variable, air dielectric	SA:3639
C-85	C.W.O. Tuning	Mica, 270 mmf. 500 vdcw	H500-6
C-86	V-9 Grid Coupling	Mica, 270 mmf. 500 vdcw	J665-47
C-87	V-9 Screen Bypass	Paper, .1 mfd. 400 vdcw	L217-35
C-88	V-9 to V-8 Coupling	Ceramic, 21 mmf. 500 vdcw	D825D-410
C-89	V-8 Load	Mica, 270 mmf. 500 vdcw	J665-47
C-90	V-10 Plate Filter	Paper, .1 mfd. 400 vdcw	L217-35
C-91	Audio Coupling	Paper, .01 mfd. 600 vdcw	L217-16
C-92	Tone adjusting	Ceramic, .01 mfd. 450 vdcw	K946-2

PARTS LIST (CONT'D)

SYMBOL	FUNCTION	DESCRIPTION	DRAWING NO.
		CAPACITORS (CONT'D)	
C-93	V-11 Screen Bypass	Paper, .1 mfd. 400 vdcw	L217-35
C-94	V-11 Plate Filter	Paper, 0.047 mfd. 600 vdcw	Q693-72
C-95	V-11 Cathode	Elect., 10 mfd. 50 vdcw	E338-9
C-96	V-12A Grid Coupling	Ceramic, .01 mfd. 450 vdcw	K946-2
C-97	V-12A Grid Filter	Ceramic, 250 mmf. 500 vdcw	D825C-315
C-98	V-14 Grid Coupling	Ceramic, .01 mfd. 450 vdcw	K946-2
C-99	V-13 Grid Coupling	Ceramic, .01 mfd. 450 vdcw	K946-2
C-100	V-13 and V-14 Cathode	Elect., 25 mfd. 50 vdcw	E338-4
C-101	T-11 Audio Compensating	Mica, .002 mfd. 500 vdcw	J666-60
C-102	T-11 Audio Compensating	Mica, .002 mfd. 500 vdcw	J666-60
C-103	V-1 Grid Coupling	Mica, .001 mfd. 300 vdcw	J665-71
C-104	Selectivity Compensating	Variable, mica dielectric, 3.5-35 mmf.	D832-2
C-105	Audio Filter	Paper, .1 mfd. 400 vdcw	L217-35
C-106	AVC Filter	Paper .1 mfd. 400 vdcw	L217-35
C-107	B Band H.F. Osc. Trimmer	Ceramic, 15 mmf. 500 vdcw	D825D-462
		RESISTORS	
R-1	Voltage Divider	Fixed, 220 ohms 1/2 W	J569-17
R-2	Voltage Divider	Fixed, 470 ohms 1/2 W	J569-21
R-3	Voltage Divider	Fixed, 680 ohms 1/2 W	J569-23
R-4	V-7 Grid	Fixed, 150,000 ohms 1/2 W	J569-51
R-5	V-1 Grid	Fixed, 100,000 ohms 1/2 W	J569-49
R-6	V-1 Screen Filter	Fixed, 47,000 ohms 1/2 W	J569-45
R-7	V-1 Plate Filter	Fixed, 2,200 ohms 1/2 W	J569-29
R-8	A.V.C. Voltage Divider	Fixed, 470,000 ohms 1/2 W	J569-57
R-9	V-2 Grid	Fixed, 100,000 ohms 1/2 W	J569-49
R-10	V-2 Plate	Fixed, 2,200 ohms 1/2 W	J569-29
R-11	V-2 Screen Filter	Fixed, 47,000 ohms 1/2 W	J569-45
R-12	V-3 Osc. Grid Leak	Fixed, 22,000 ohms 1/2 W	J569-41
R-13	V-3 Osc. Grid	Fixed, 68 ohms 1/2 W	J569-11
R-14	V-3 Signal Grid Filter	Fixed, 22 ohms 1/2 W	J569-5
R-15	V-4 Plate Filter	Fixed, 2,200 ohms 1/2 W	J569-29
R-16	Crystal Filter Bridge Resistance Balancing	Fixed, 470 ohms 1/2 W	J569-21
R-17	V-5 Grid Filter	Fixed, 470,000 ohms 1/2 W	J569-57
R-18	V-5 Cathode	Fixed, 47 ohms 1/2 W	J569-9
R-19	V-5 Screen Filter	Fixed, 47,000 ohms 1/2 W	J569-45
R-20	V-6 Plate Filter	Fixed, 2,200 ohms 1/2 W	J569-29
R-21	V-6 Grid Filter	Fixed, 470,000 ohms 1/2 W	J569-57
R-22	V-6 Screen Filter	Fixed, 47,000 ohms 1/2 W	J569-45
R-23	V-7 Grid Filter	Fixed, 470,000 ohms 1/2 W	J569-57
R-24	V-7 Screen Filter	Fixed, 47,000 ohms 1/2 W	J569-45
R-25	V-7 Plate Filter	Fixed, 2,200 ohms 1/2 W	J569-29
R-26	V-4 Screen Filter	Fixed, 18,000 ohms 1/2 W	J569-40
R-27	V-4 Signal Grid Filter	Fixed, 22 ohms 1/2 W	J569-5
R-28	V-4 Osc. Grid Filter	Fixed, 10,000 ohms 1/2 W	J569-37
R-29	V-3 Plate Filter	Fixed, 2,200 ohms 1/2 W	J569-29
R-30	V-10 Filament Dropping	Fixed, W.W., 4.3 ohms 1 W	K098-48
R-31	V-16 Grid Leak	Fixed, 470,000 ohms 1/2 W	J569-57
R-32	V-16 Cathode Bias	Fixed, 470 ohms 1/2 W	J569-105
R-33	V-16 Screen Filter	Fixed, 47,000 ohms 1/2 W	J569-45
R-34	V-16 Plate Filter	Fixed, 2,200 ohms 1/2 W	J569-29

PARTS LIST (CONT'D)

SYMBOL	FUNCTION	DESCRIPTION	DRAWING NO.
		RESISTORS (CONT'D)	
R-35	R.F. Gain Control	Variable, W.W., 10,000 ohms	K349-3
R-36	Voltage Divider	Fixed, 500 ohms 10 W	M707-3
R-37	Not Used		
R-38	A.V.C. Load	Fixed, 15,000 ohms 1/2 W	J569-39
R-39	S-Meter Adjustment	Variable, 1,000 ohms	D831-2
R-40	V-12B Plate Dropping	Fixed, 47,000 ohms 1/2 W	J569-45
R-41	A.V.C. Voltage Divider	Fixed, 470,000 ohms 1/2 W	J569-57
R-42	V-15 Plate Dropping	Fixed, 3,900 ohms 10 W	E959-12
R-43	V-9 Grid	Fixed 47,000 ohms 1/2 W	J569-45
R-44	V-9 Screen Filter	Fixed, 100,000 ohms 1/2 W	J569-49
R-45	V-9 Screen Bleeder	Fixed, 100,000 ohms 1/2 W	J569-49
R-46	V-9 Plate Filter	Fixed, 100,000 ohms 1/2 W	J569-49
R-47	Limiter Control	Variable, 100,000 ohms	J681-1
R-48	Limiter Plate Filter	Fixed, 270,000 ohms 1/2 W	J569-54
R-49	V-8 Load	Fixed, 68,000 ohms 1/2 W	J569-47
R-50	Phono. Terminating	Fixed, 100,000 ohms 1/2 W	J569-49
R-51	V-10 Load	Fixed, 270,000 ohms 1/2 W	J569-54
R-52	Tone Control	Variable, 1,000,000 ohms	K424-2
R-53	A.F. Gain Control	Variable, with switch 500,000 ohms	K347-1
R-54	V-11 Cathode	Fixed, 2,200 ohms 1/2 W	J569-29
R-55	V-11 Plate Load	Fixed, 100,000 ohms 1/2 W	J569-49
R-56	V-11 Plate Filter	Fixed, 100,000 ohms 1/2 W	J569-49
R-57	V-11 Screen Filter	Fixed, 470,000 ohms 1/2 W	J569-57
R-58	Inverse Feedback Voltage Divider	Fixed, 100 ohms 1/2 W	J569-13
R-59	Inverse Feedback Voltage Divider	Fixed, 4,700 ohms 1/2 W	J569-33
R-60	V-12A Grid	Fixed, 100,000 ohms 1/2 W	J569-49
R-61	V-12A Cathode Bias	Fixed, 4,700 ohms 1/2 W	J569-33
R-62	V-12A Cathode Load	Fixed, 47,000 ohms 1/2 W	J569-45
R-63	V-12A Plate Load	Fixed, 47,000 ohms 1/2 W	J569-45
R-64	V-14 Grid	Fixed, 270,000 ohms 1/2 W	J569-54
R-65	V-13 Grid	Fixed, 270,000 ohms 1/2 W	J569-54
R-66	V-13 and V-14 Cathode Bias	Fixed, 330 ohms 2 W	J572-19
R-67	Head Phone Load	Fixed, 470 ohms 2 W	J572-21
R-68	E Band 1st. Det. Loading	Fixed, 1500 ohms 1/2 W	J569-27
R-69	Audio Filter	Fixed, 470,000 ohms 1/2 W	J569-57
R-70	V-15 Bleeder	Fixed, 10,000 ohms 2 W	J572-37
R-71	V-12B Grid	Fixed, 330,000 ohms 1/2 W	J569-55
R-72	Voltage Divider	Fixed, 100 ohms 1/2 W	J569-13
		MISCELLANEOUS	
CF-1	Crystal Filter	455 Kc.	SA:9195
E-1	Antenna Input Terminal Panel	3 terminal-screw type	E261-3
E-2	Remote Standby-Rec. Switch Terminal Panel	3 terminal-screw type	E259-1
E-3	Audio Output Terminal Panel	3 terminal-screw type	E259-2
F-1	A.C. Line Fuse	2 amp., 125 volts	F135-19
I-1	S-Meter Lamp	6.8 V., .15 Amp.	F136-6
I-2	Dial Lamp	6.8 V., .15 Amp.	F136-6
I-3	Dial Lamp	6.8 V., .15 Amp.	F136-6
J-1	Phono Jack	Tip jack type	J993-1
J-2	Headphone Jack	Multi-circuit	F316-1
L-1	A Band 1st. R.F. Amp. Inductor		SA:9320

PARTS LIST (CONT'D)

SYMBOL	FUNCTION	DESCRIPTION	DRAWING NO.
		MISCELLANEOUS (CONT'D)	
L-2	B Band 1st. R.F. Amp. Inductor		SA:3759
L-3	C Band 1st. R.F. Amp. Inductor		SA:9219
L-4	D Band 1st. R.F. Amp. Inductor		SA:9316
L-5	E Band 1st. R.F. Amp. Inductor		SA:9321
L-6	A Band 2nd. R.F. Amp. Inductor		SA:9323
L-7	B Band 2nd. R.F. Amp. Inductor		SA:3754
L-8	C Band 2nd. R.F. Amp. Inductor		SA:9324
L-9	D Band 2nd. R.F. Amp. Inductor		SA:9325
L-10	E Band 2nd. R.F. Amp. Inductor		SA:9322
L-11	A Band 1st. Det. Inductor		SA:9323
L-12	B Band 1st. Det. Inductor		SA:9327
L-13	C Band 1st. Det. Inductor		SA:4353
L-14	D Band 1st. Det. Inductor		SA:9328
L-15	E Band 1st. Det. Inductor		SA:9326
L-16	A Band H.F. Osc. Inductor		SA:9333
L-17	B Band H.F. Osc. Inductor		SA:9334
L-18	C Band H.F. Osc. Inductor		SA:9335
L-19	D Band H.F. Osc. Inductor		SA:9336
L-20	E Band H.F. Osc. Inductor		SA:9332
L-21	CF-1 Input Tuning	Inductor	SA:9197
L-22	CF-1 Output Tuning	Inductor	SA:9201
L-23	T-2 Coupling	R.F. choke, 1.6 microhenries	SB:2165
L-24	T-1 Input Tuning	Variable iron core tuning	SA:7611
L-25	T-1 Output Tuning	Variable iron core tuning	Part of L-24
L-26	T-2 Input Tuning	Variable iron core tuning	SA:7611
L-27	T-2 Output Tuning	Variable iron core tuning	Part of L-26
L-28	T-3 Input Tuning	Variable iron core tuning	SA:7611
L-29	T-3 Output Tuning	Variable iron core tuning	Part of L-28
L-30	T-4 Input Tuning	Variable iron core tuning	SA:7611
L-31	T-4 Output Tuning	Variable iron core tuning	Part of L-30
L-32	T-4 Coupling	R.F. choke, 1.6 microhenries	SB:2165
L-33	T-5 Input Tuning	Variable iron core tuning	SA:7611
L-34	T-5 Output Tuning	Variable iron core tuning	Part of L-33
L-35	T-6 Tuning	Variable iron core tuning	SA:9216
L-36	T-7 Output Tuning	Variable iron core tuning	SA:9118
L-37	T-7 Input Tuning	Variable iron core tuning	Part of L-36
L-38	T-8 Output Tuning	Variable iron core tuning	SA:9118
L-39	T-8 Input Tuning	Variable iron core tuning	Part of L-38
L-40	Filter Choke	17 henries	S669-1
L-41	T-9 Tuning	Variable iron core tuning	SA:9218
L-42	T-10 Tuning	Variable iron core tuning	SA:3634
M-1	S Meter	0-1 Ma. D.C. range	K382-4
P-1	A.C. Line Cord and Plug	Rubber covered, 2 contact	E544-1
P-2	A.C. Jumper Plug	8 Prong octal	J674-1
S-1		D.P. 5 position	J587-1
S-1A	Gain Adjustment	S.P. 5 position	
S-1B		S.P. 5 position	
S-2	1st. R.F. Amp. Bandswitch	D.P. 5 position	J587-1
S-2A		S.P. 5 position	
S-2B		S.P. 5 position	

PARTS LIST (CONT'D)

SYMBOL	FUNCTION	DESCRIPTION	DRAWING NO.
		MISCELLANEOUS (CONT'D)	
S-3	1st. R.F. Amp Bandswitch	D.P. 5 position	J586-1
S-3A		S.P. 5 position	
S-3B		S.P. 5 position	
S-4	2nd. R.F. Amp Bandswitch	D.P. 5 position	J586-1
S-4A		S.P. 5 position	
S-4B		S.P. 5 position	
S-5	2nd. R.F. Amp Bandswitch	D.P. 5 position	J586-1
S-5A		S.P. 5 position	
S-5B		S.P. 5 position	
S-6	1st. Det. Amp. Bandswitch	D.P. 5 position	J586-1
S-6A		S.P. 5 position	
S-6B		S.P. 5 position	
S-7	1st. Det. Amp. Bandswitch	D.P. 5 position	J586-1
S-7A		S.P. 5 position	
S-7B		S.P. 5 position	
S-8	H.F. Osc. Bandswitch	D.P. 5 position	L147-1
S-8A		S.P. 5 position	
S-8B		S.P. 5 position	
S-9	H.F. Osc. Bandswitch	S.P. 5 position	R047-1
S-10	Double Conversion Switch	Sliding type	R027-2
S-11	Selectivity Switch	D.P. 6 position	E195-1
S-12	A.V.C.-M.V.C. Switch	Toggle, S.P.S.T.	E230-2
S-13	C.W.O. Switch	S.P.D.T. rotary	F191-2
S-14	Limiter Switch	S.P.D.T.	Part of R-47
S-15	Radio-Phono Switch	D.P.D.T. toggle	E706-1
S-16	A.C. Line Switch	S.P.S.T.	Part of R-53
S-17	Standby-Receive Switch	S.P.S.T. toggle	E230-2
T-1	2nd. I.F. Transformer (V-5 Plate)	455 Kc.	SA:9123
T-2	2nd. I.F. Transformer (V-6 Grid)	455 Kc.	SA:9123
T-3	3rd. I.F. Transformer (V-6 Plate)	455 Kc.	SA:9123
T-4	3rd. I.F. Transformer (V-7 Grid)	455 Kc.	SA:9123
T-5	2nd. Det. Input	455 Kc.	SA:9123
T-6	2nd. Conv. Osc. Transformer	1265 Kc.	SA:9215
T-7	I.F. Transformer	1720 Kc.	SA:9122
T-8	I.F. Transformer	1720 Kc.	SA:9122
T-9	A.V.C. Amp. Transformer	455 Kc.	SA:9217
T-10	C.W.O. Transformer	455 Kc.	SA:3638
T-11	Audio Output Transformer	8 and 500 ohm output impedance	SA:3897
T-12	Power Transformer	115-230 Volts	S461-1
V-1	1st. R.F. Amp.	6BA6	
V-2	2nd. R.F. Amp.	6BA6	
V-3	1st. Converter	6BE6	
V-4	2nd. Converter	6BE6	
V-5	1st. I.F. Amp.	6BA6	
V-6	2nd. I.F.	6BA6	
V-7	3rd. I.F.	6BA6	
V-8	2nd. Det. A.V.C.	6AL5	
V-9	C.W. Osc.	6SJ7	
V-10	Limiter	6AL5	
V-11	1st. Audio	6SJ7	

PARTS LIST (CONT'D)

SYMBOL	FUNCTION	DESCRIPTION	DRAWING NO.
		MISCELLANEOUS (CONT'D)	
V-12	Phase Inverter and S-Meter Amp.	6SN7GT	
V-13	Audio Output	6V6GT	
V-14	Audio Output	6V6GT	
V-15	Voltage Regulator	OB2	
V-16	A.V.C. Amp.	6AH6	
V-17	Rectifier	5U4G	
X-1	Battery Socket	Octal	J625-1
X-2	Accessory Socket	Octal	J625-1
Y-1	Crystal Resonator	455 Kc.	E979-1

DESCRIPTION	DRAWING NO.
MECHANICAL PARTS	
Power cord lock	K172-1
Main tuning dial	SA:9308
Bandspread tuning dial	SA:9309
Pinch drive (2)	SA:9310
Detent mechanism for bandswitch	J593-2
1st. R.F. coil compartment	SA:9311
2nd. R.F. coil compartment	SA:9312
Detector coil compartment	SA:9313
Oscillator coil compartment	SA:9314
Double conversion slideswitch	R027-2
Insulated couplings on antenna trimmer and bandswitch shafts	SA:22
Coupling on selectivity control shaft	D964-2
Non-insulated coupling on bandswitch shaft	SA:3592
Fuse extractor post	E510-1
Dial light socket (2)	J721-1
Main tuning dial window	M967-2
Bandspread tuning dial window	M967-3
Antenna trimmer control knob	SA:4404
Phasing and C.W.O. pitch control knobs (2)	SA:6868
Main and bandspread tuning knobs (2)	SA:8456
R.F. Gain and tone control knobs (2)	SA:6867

DESCRIPTION	DRAWING NO.
MECHANICAL PARTS	
A.C. switch and A.F. Gain control knob	SA:6871
Selectivity control knob	SA:6869
Bandswitch control knob	SA:8642
Limiter control knob	SA:6870
C.W.O. Off-On knob	SA:8460
Shield for remote standby connections	SA:9194
Shield for speaker connections	SA:9337
MECHANICAL PARTS USED ON TABLE MODEL ONLY	
Cabinet wraparound	SA:9338
National Company insignia	J791-4
Cabinet back	J719-9
Cabinet cover	J701-8
Cover hinge (2)	J825-2
MECHANICAL PARTS USED ON RACK MODEL ONLY	
National Company insignia	J791-3
Side plate (right)	SA:9461
Side plate (left)	SA:9462
Chassis bottom plate	K749-2
Dust Cover	SA:9463

INSTRUCTIONS FOR THE NATIONAL NFM-83-50 NARROW-BAND F.M. ADAPTOR

INSTALLATION

The NFM-83-50 is installed in the NC-183D receiver by plugging the adaptor unit into the Accessory Connector Socket, X-2, on top of the chassis. A mounting bracket is furnished to hold the adaptor unit securely in position. The adaptor unit is aligned at National Company laboratories and realignment is not necessary.

OPERATION

The instructions given in Section 3, Operation, of this Instruction Book are applicable for the reception of narrow-band F.M. signals except for the following modifications:

1. Set the Radio-Phono switch at Phono.
2. The A.V.C.-M.V.C. switch must be at the A.V.C. position.

It is recommended that when the operator is scanning a band for signals that the Radio-Phono switch be set at Radio, the A.M. position. An F.M. signal is usually indicated by the presence of an audio null in the center of the signal carrier. When an F.M. signal is encountered the Radio-Phono switch should then be set at Phono and the signal tuned for maximum S-meter reading.

ALIGNMENT

The NFM-83-50 is carefully aligned before shipment and no realignment is required unless the adaptor is accidently misaligned. The necessity of realignment can be determined by the A·M. rejection capabilities of the adaptor unit. Proper alignment will be indicated when the maximum A.M. rejection occurs at the center of the A.M. carrier. Maximum S-meter reading will indicate the center of the carrier.

The equipment required for alignment is a high-impedance vacuum tube voltmeter and an A.M. signal generator. The signal generator used should have an output reasonably free of any frequency modulation. The use of a broadcast station as a signal source, in place of a signal generator, would provide a test signal meeting the above requirements. In any case, the signal strength of the test signal should be of the order to provide an S-meter reading of from 2 to 5 S-units when the NC-183D is correctly tuned to the test signal.

The preliminary alignment procedure is as follows:

1. Connect the high-impedance voltmeter between the adaptor test point jack, J-1, and chassis. The polarity of the voltage will depend on the alignment of the adaptor, connect the voltmeter to obtain an up-scale reading.
2. Connect a signal source to the antenna terminals, A and A, at the rear of the NC-183D. If a signal generator is used make the connection through a 300 ohm dummy load and select a frequency in the standard broadcast band.
3. Set the C.W.O. switch at Off and turn the C.W.O. control to 0.
4. Set the Selectivity switch at Off.
5. Set the Limiter control at Off.
6. Turn the Bandspread dial knob to the SET mark at 180 on the linear scale of the Bandspread dial.
7. Set the Bandswitch at E.
8. Set the Standby-Receive switch at Rec.
9. Set the A.V.C.-M.V.C. switch at A.V.C.
10. Set the Radio-Phono switch at Phono
11. Turn the R.F. Gain control at 10.
12. Turn the A.F. Gain control from A.C. Off to 5.
13. Tune the test signal by adjustment of the Main Tuning knob. The correct tuning point is the setting that produces maximum S-meter reading.

Alignment of the NFM-83-50 is effected as follows:

1. Detune both primary, L-1, and secondary, L-2, I.F. trimmers by rotating the screw adjustments until they are withdrawn from the shield can as far as possible. The adjustment with the dot of red paint opposite it is the primary trimmer L-1.
2. Tune primary trimmer L-1 for maximum reading on the voltmeter. If two peaks in output are observed, the correct peak will be the first one encountered when rotating the screw adjustment into the shield can.
3. Tune secondary trimmer L-2 for a zero reading on the voltmeter. It will be noted that there is a cross-over in the polarity of the test voltage at this point.
4. Adjust capacitor C-9 for a null in the audio output. This capacitor is accessible after removal of the button plug on the side of the adaptor unit.
5. Adjustment of capacitor C-9 may affect the zero voltage reading obtained by adjustment of the secondary

trimmer L-2. Retrim L-2 and C-9, as necessary, until both a zero reading on the voltmeter and a null in the audio output are obtained.

PARTS LIST

SYMBOL	DESCRIPTION	DRAWING NO.
C-1	Ceramic,10 Mmf, 500 vdcw	D825D-402
C-2	Ceramic, 38.5 Mmf, 500 vdcw	D825D-414
C-3	Mica, 0.01 Mfd, 300 vdcw	J666-56
C-4	Mica, 0.001 Mfd, 300 vdcw	J665-71
C-5	Mica, 100 Mmf, 500 vdcw	H500-7
C-6	Mica, 180 Mmf, 500 vdcw	H500-3
C-7	Mica, 180 Mmf, 500 vdcw	H500-3
C-8	Ceramic, 38 Mmf, 500 vdcw	D825D-424
C-9	Ceramic, Variable, 7–35 Mmf.	E311-4
C-10	Elect. 1 Mfd, 450 vdcw	E338-10
C-11	Mica, 0.01 Mfd, 300 vdcw	J666-56
C-12	Mica, 470 MMf. 500 vdcw	J665-56
C-13	Mica, 0.01 Mfd, 300 vdcw	J666-56
R-1	Fixed, 1 Megohm, 1/2 W.	J569-61
R-2	Fixed, 1,000 Ohms, 1/2 W.	J569-25
R-3	Fixed, 47,000 Ohms, 1/2 W.	J569-45
R-4	Fixed, 47,000 Ohms, 1/2 W.	J569-45
R-5	Fixed, 15,000 Ohms, 1/2 W.	J569-39
R-6	Fixed, 15,000 Ohms, 1/2 W.	J569-39
R-7	Fixed, 4,700 Ohms, 1/2 W.	J569-33
J-1	Tip Jack, Bakelite	K421-1
L-1	Adjustable Iron-Core	SA:4892
L-2	Adjustable Iron-Core	SA:4891
P-1	8 Prong Octal	K783-1
T-1	Ratio Type 455 Kc.	SA:4890
V-1	6SK7	
V-2	6H6	

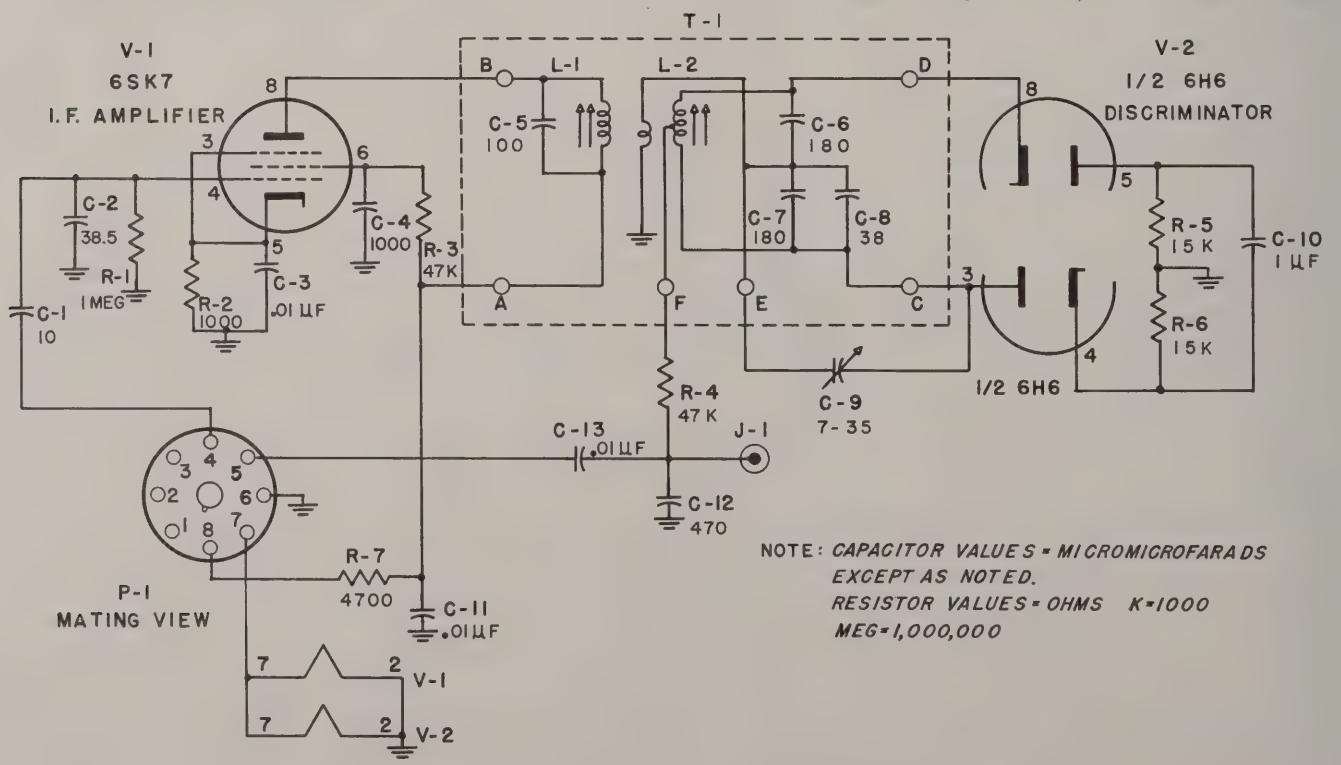


Figure No. 14. Schematic Diagram, NFM-83-50 Adaptor

INSTRUCTIONS FOR THE NATIONAL SOJ-3 SELECT-O-JECT

1. GENERAL

The type SOJ Select-O-Ject is an audio frequency device designed to work into the audio circuits of an associated radio receiver. Properly adjusted, it will reject or boost any audio frequency selected at will between the limits of approximately 80 to 10,000 cycles. Its capabilities in this application are graphically illustrated on Figure No. 16. The unit will also serve as an audio oscillator and is excellent for code practice use. As an audio oscillator, it will deliver approximately two volts of audio output at any frequency in the 80 to 10,000 cycle range.

The many advantages to be realized by the use of this device are pointed out in an article entitled 'The Select-oject' in the November 1949 issue of QST. This article also contains a very informative theoretical discussion.

2. INSTALLATION

The SOJ-3 Select-O-Ject has a cable terminated in an octal plug for direct connection to the accessory socket of the NC-183D receiver. To connect the SOJ-3 to the accessory socket of the receiver, punch out the circular knock-out hole stamped out on the rear panel of the cabinet, insert the cable and plug from the SOJ-3 through this hole and seat the plug firmly into the accessory socket.

The required input voltages for the Select-O-Ject are supplied directly by the accessory socket i.e., 6.3 volts at 0.6 amperes for the heaters and 230 volts at 4 milliamperes for the B-plus circuits.

3. OPERATION

To use the Select-O-Ject set the Radio-Phono switch of the receiver at Phono. When the phono input jack is used for Phono operation, disconnect the Select-O-Ject from the receiver. When it is desired to use the radio circuits without the Select-O-Ject, set the Radio-Phono switch at Radio, the Select-O-Ject need not be disconnected.

The following explanation of the function of each control on the Select-O-Ject will enable the operator to realize the full benefits of this accessory.

The Reject-Boost switch adjusts the unit to reject or boost, respectively, a particular audio frequency. In the Reject position, the Reject control is operative and is adjusted to provide maximum attenuation of the undesired audio frequency. It will be found that the correct setting of the Reject control will occur at approximately 2 o'clock on the control dial. Its adjustment is critical and it must be set carefully while simultaneously adjusting the Pitch control to the undesired frequency. After the initial adjustment of the Reject control is made, it need not be adjusted again over the entire frequency range. Adjustment of the Pitch control will then provide maximum attenuation of the undesired audio frequency.

With the Reject-Boost switch in the Boost position, the Boost control is operative. As the Boost control is advanced in a clockwise direction the circuit becomes more regenerative, finally breaking into oscillation. Beyond this point the circuit operates as an audio oscillator. For maximum boost of an incoming audio frequency, the Boost control should be set as close as possible to the oscillation point without producing sustained oscillation. The Pitch control is used to select the frequency to be boosted.

To use the receiver circuits without the boosting or rejecting effects on the signal, set the Reject-Boost switch at Reject and set the Pitch control at the extreme counterclockwise limit of its rotation.

PARTS LIST

SYMBOL	DESCRIPTION	DRAWING NO.
C-1	Paper, .05 mfd. 400 vdcw	D827-1
C-2	Mica, .001 mfd. 500 vdcw	J666-13
C-3	Elect. 20 mfd. 450 vdcw	E338-16
C-4	Mica, .001 mfd. 500 vdcw	J666-13
C-5	Paper, .05 mfd. 400 vdcw	D827-1
C-6	Paper, .05 mfd. 400 vdcw	D827-1
C-7	Paper, .05 mfd. 400 vdcw	D827-1
R-1	Fixed, 330,000 ohms 1/2 W	J569-55
R-2	Fixed, 1,000,000 ohms 1/2 W	J569-61
R-3	Fixed, 1,800 ohms 1/2 W, paired within 2% of R-4	P469-1
R-4	Fixed, 1,800 ohms 1/2 W, paired within 2% of R-3	P469-1
R-5A and B	Variable, dual section, 2,500,000 ohms each	M879-2
R-6	Fixed, 10,000 ohms 1/2 W	J569-37
R-7	Fixed, 3,900 ohms 1/2 W, paired within 2% of R-8	P469-2
R-8	Fixed, 3,900 ohms 1/2 W, paired within 2% of R-7	P469-2
R-9	Fixed, 10,000 ohms 1/2 W	J569-37
R-10	Fixed, 22,000 ohms 1/2 W	J569-41
R-11	Fixed, 5,600 ohms 1/2 W	J569-34
R-12	Fixed, 22,000 ohms 1/2 W	J569-41
R-13	Fixed, 22,000 ohms 1/2 W	J569-41
R-14	Fixed, 470,000 ohms 1/2 W	J569-57
R-15	Variable, 500,000 ohms	J533-9
R-16	Variable, 500,000 ohms	J533-9
R-17	Fixed, 1,800 ohms 1/2 W	J569-28
R-18	Fixed, 3,900 ohms 1/2 W	J569-32
S-1	DPDT, Wafer	K440-3

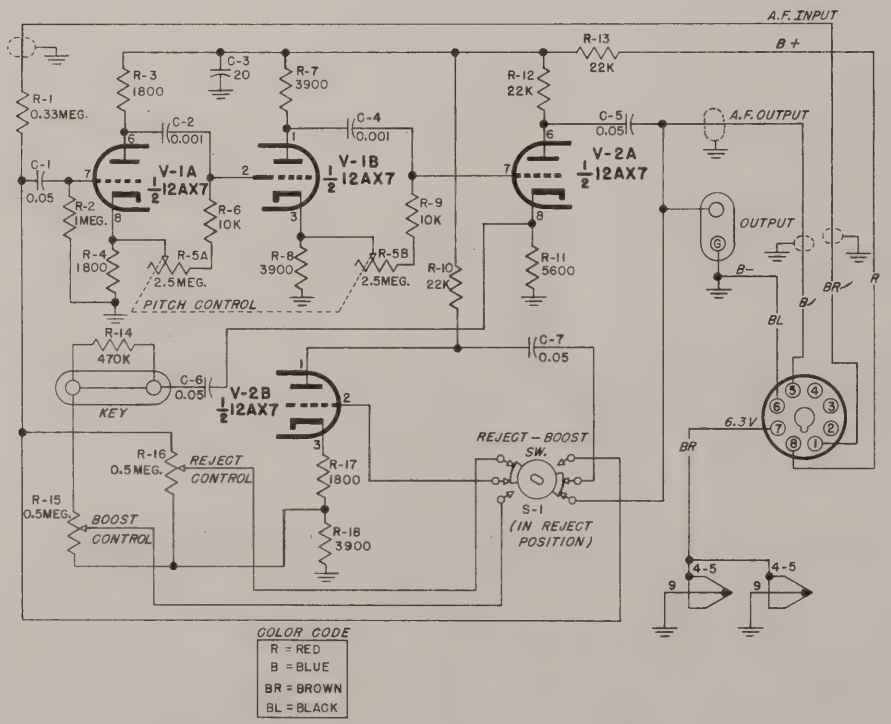


Figure No. 15. Schematic Diagram of Select-O-Ject

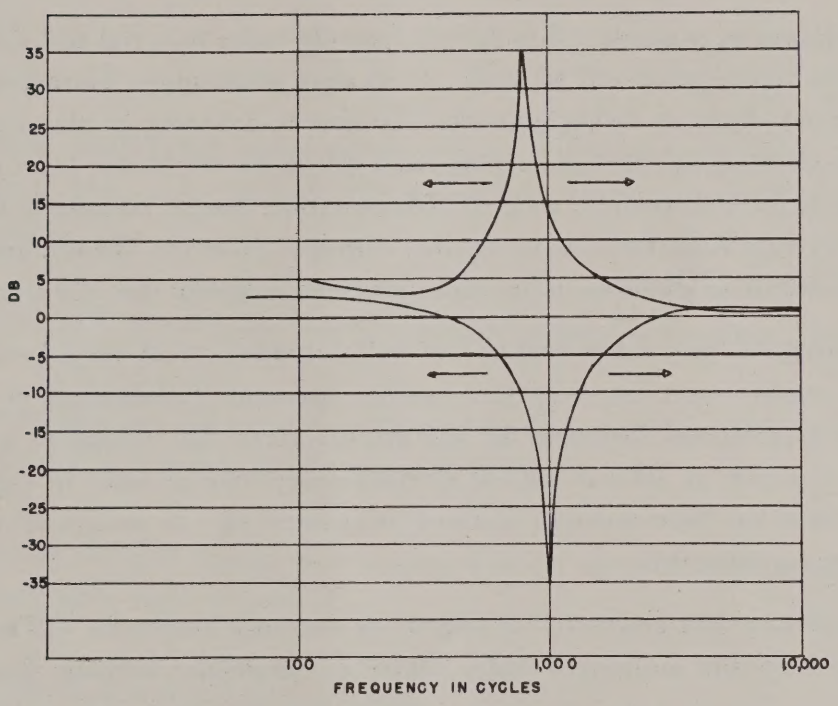


Figure No. 16. Characteristic Curve of Select-O-Ject Performance

Standard Form Warranty

Adopted by the Radio Manufacturers Association, Inc.

This equipment is warranted to be free from defective material and workmanship and repair or replacement will be made of any part which under normal installation, use and service discloses defect, provided the unit is delivered by the owner to the manufacturer or through the authorized radio dealer or wholesaler from whom purchased, intact, for examination, with all transportation charges prepaid to the factory, within ninety days from the date of original shipment from the factory, and provided that such examination discloses in the manufacturer's judgment that it is thus defective.

This warranty does not extend to any radio products which have been subjected to misuse, neglect, accident, incorrect wiring, improper installation, or to use in violation of instructions furnished by the manufacturer, nor extend to units which have been repaired or altered outside of the factory, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith of other manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for the manufacturer any other liability in connection with the sale of their radio products.

National Company, Inc. reserves the right to make any change in design or to make addition to, or improvements in, its products without imposing any obligations upon itself to install them in its products previously manufactured.

THE NATIONAL NC-183D RECEIVER

Equipment List

NC-183DT RECEIVER, table mounting gray finish, complete with tubes, crystal filter, noise limiter, 115 and 230 volt, 50/60 cycle built-in power supply.

NC-183DTS 10″ PM Loudspeaker in matching cabinet for the above Receiver.

NC-183DR RECEIVER, same as table model but mounted on ⅛″ aluminum standard rack panel, 10½″ high, gray finish.

NC-183DRS 10″ PM Loudspeaker mounted on ⅛″ aluminum standard rack panel, 10½″ high, gray finish.

NFM-83-50 Narrow-Band F.M. Adaptor.

SOJ-3 Select-O-Ject.

Prices on Application

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National

NC

EST. 1914

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U. S. A.

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